

COAL AGE

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No. 19

WHERE DO WE STAND?

That's the question some are now asking us and we concede their right to know. Every advance, industrial or moral, must have its champions, and those who entrust themselves to such leadership want to know where they are going and the reason therefor.

All our promises and declarations were made before the birth of this journal, nineteen weeks ago. With the first issue, we quit talking and commenced "sawing wood," and since then have published 630 pages of the best coal literature it was possible to secure. During this time, we have studiously avoided the use of our reading pages for self-advertisement, believing that "making good" is a matter of deeds, not talk. All our time has been devoted to building a paper that would be worthy and representative of the great industry we serve.

To the few competitors who wished us ill, we extend greetings, and desire to say that our refraining from retort was through lack of sufficient cause and not from any overwhelming desire to avoid controversy. There's no use in bothering when the missiles intended for you are hurled straight up in the air. You can always feel sure, in such a case, that if one of the bombs doesn't come down and blow your adversary's head off, bad manipulation of his artillery will cause an explosion, the result of which will be equally fatal to him.

You can stand at the foot of a mountain, look up, and shout that the ground before you is level, but you'll climb all right before you get to the top. Those who are proclaiming that COAL AGE is a paper for managers only, or for miners only; for theorists or for practicalists; for anthracite, or for bituminous men, do not interest us in their outcry. Any success they win through misrepresentation is temporary. We're building a journal for all, and expect it to last a thousand years, not one or two. Our conception is that we've a life's job before us; a serious, responsible task, which can result in great good or great harm to the multitude of workers we represent.

We have a clear idea of what we propose to accomplish, and entertain no fear of human coyotes who

follow the scent and only pounce when your back is turned or your foot slips. Confidence in our own ability is not lacking, but what we desire above all else is the complete trust of our readers; the certain knowledge on their part that we trail no halter and that we are for the man who is in the right, whether he owns the mine or works in it.

Treading on what is supposed to be dangerous ground, we wish to assert *right now* that we are not opposed to Unionism when labor is organized on a sane basis and conducted for the good of the majority. It is also essential to fairness that such federations be endowed with moral and financial liabilities proportionate to the obligations assumed by the other party to such contracts. However, we abhor those leaders who are traitors to the cause of the men, and who grow fat on the sufferings of a misguided and trusting body of fellow-workmen.

As to the Bureau of Mines, we believe its work is beneficial and that the investigations being carried on are hastening the advance in the art of mining; however, we do not favor a further extension of the powers of the bureau, so far as coal mining is concerned, for when such a federal department crosses the line that divides the province of suggestion from that of dictation, trouble will ensue through interference in the management of private enterprise.

Furthermore, the idea somewhat prevalent outside the industry that the creation of the Bureau of Mines saved coal mining from utter destruction is erroneous. We would have continued to advance without government aid, although we welcome the valuable help they have rendered, and believe the industry is entitled to a continued careful expenditure of public money in the interest of increased safety and efficiency.

In conclusion, we will say that our chief aim is to voice the sober judgment and final opinion of the majority in our industry, to live according to new standards and not be bound by obsolete traditions. We earnestly solicit your suggestions in the interest of our common welfare. Help us make COAL AGE a human document from cover to cover. It must not voice the opinion of any man or clique of men. Above all, encourage us in our ambition to be right rather than popular.

Mine Rescue Work in Illinois

By H. H. Stoek*

Two years ago, in November, 1909, the people of this country were startled and stunned by a disaster at Cherry, Ill., which will always stand out prominently among mine casualties, not only on account of the large number of lives lost, but also because it showed that a serious calamity could be started by so simple a cause as the burning of a bale of hay. This disaster was the inciting cause for legislation, which could possibly never have been enacted but for the condition of public opinion, brought about by the disaster.

The special session of the Illinois legislature, which convened in January, 1910, passed among other laws, intended to increase safety in mining, one providing for the establishment of a mine-rescue service throughout the state. The governor was empowered to appoint a commission

The State of Illinois has established three mine-rescue stations and equipped three rescue cars. Men from these cars attend all mine disasters and train mine-rescue men at the surrounding mines.

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BUILDINGS PROVIDED

The foundations are of solid concrete, finished smooth on the inside wherever the surfaces are exposed. The walls of the buildings are of timber covered on

pantry and a rear entrance. Behind the front-entrance porch, a hallway leads to the rescue chamber, and on the right is an entrance to an equipment room, which is divided into two parts, one for the storing of appliances and the other for use as a workshop.

The rescue-training chamber and lecture hall occupy the rear of the first floor. The lecture or observation hall, Figs. 1 and 6, is a room 30 ft. by 57 ft., lighted from above by skylights, but it can be darkened when desired by curtains. The sides of the lecture hall are of glass, thus giving a full view of the training gallery, which surrounds the lecture hall on three sides. This auditorium will seat comfortably about 100 persons, is well lighted and is provided with a special lighting switch, so that a stereopticon can be used for lecture purposes. Stereopti-

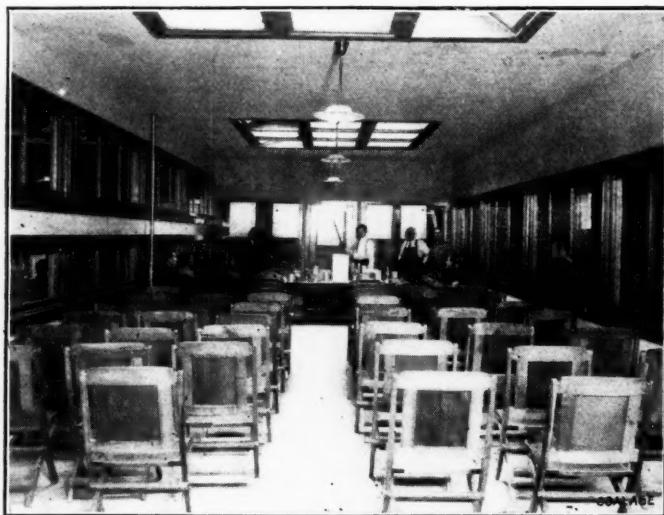


FIG. 1. LECTURE ROOM IN RESCUE STATION



FIG. 2. RIGHT SIDE OF TRAINING GALLERY

consisting of two coal-mine operators, two coal miners, one state mine inspector, one representative of the department of mining at the University of Illinois, and one representative of the Federal Bureau of Mines. This commission was authorized to purchase, or accept as a gift, suitably located sites for the establishment of three rescue stations, and to establish, equip and operate the same, and for these purposes the sum of \$75,000 was appropriated.

After visiting a number of suggested locations, the mine rescue commission selected LaSalle, Springfield and Benton for the northern, central and southern stations, respectively. Plans for the buildings were drawn by the state architect from sketches furnished by the commission. Fig. 4 shows the Springfield station. As all three buildings were erected from the same plans and are practically identical, a description of one will suffice for all.

the outside with metal lath, which is coated with two coats of plaster throughout. The extreme dimensions are 61 ft. 6 in. in width and 87 ft. in depth. The height to the peak of the roof is 29 ft. 6 in.

The front part of the building contains two floors, and is divided into the living apartments, office and workshop. The rear portion is one story in height, and contains the rescue chamber.

The basement contains a store, coal and furnace rooms, and has concrete floors and finished concrete walls throughout.

On the first floor, Fig. 6, at the left of the entrance, is the office of the superintendent, in which is a large closet for the storage of maps. Back of the office is a hallway leading to the dining room, which also serves as a general living room. Adjacent to this hall is a closet and toilet. In the rear of the dining room is the kitchen, off which is a commodious

con slides, together with notes for the same, are used by the superintendent or other lecturer at the station, and these lectures are furnished by the department of mining engineering of the University of Illinois.

The training gallery is an air-tight gas chamber, in which sulphur can be burned to produce sulphur dioxide. Other irrespirable gases may be used instead of sulphurous oxide. In this chamber training with oxygen helmets and other rescue apparatus is carried on. The right side of the gallery, Fig. 2, is 8 ft. wide and 10 ft. 4 in. high, and in this part are placed a mine track and a mine car. The left side of the gallery is only 6 ft. wide and is divided into two parts, one of which is 5 ft. 2 in. and the other 4 ft. 7 in. in height. This division allows work to be carried on in restricted quarters and the upper part also serves as an overcast. There is a toilet at one end of the left side of the rescue chamber. The

end of the gallery, Fig. 6, contains a track for a mine car and a tunnel, shown at the right, through which men crawl when equipped with rescue apparatus, in order to accustom themselves to work in restricted quarters.

The second floor, Fig. 6, contains a dormitory, in which there are twelve white-enamede iron beds. A commodious toilet room, adjoining, is fitted with lockers, shower baths, wash bowls and other toilet facilities. There is also a bathroom on the opposite side of the hall. There are three rooms which can be used by the family of the superintendent for private sleeping apartments.

The building is well lighted with electricity and thoroughly ventilated by means of numerous well placed windows. It is finished throughout in natural wood, stained a dark burnished-gray color, presenting an excellent appearance.

RESCUE CARS

At each station there is a car for use in transporting the rescue appliances and the party manning the station to all disasters to the scene of an accident. The exteriors of these cars are shown in Fig. 3. Fig. 5 shows the plan of one of them and this will illustrate

storing the rescue apparatus, and it also affords space for demonstration purposes. In one corner are three oxygen tanks connected to a pump, as shown. On the opposite side is a storage rack for seven other oxygen tanks. In one corner is a coal box and in the other a locker for pulmotor, first-aid supplies and other small articles, and for the storing of potash cartridges. The helmets are hung by hooks from the ceiling of the car or on the side, and, if necessary to prevent them from swinging, a strap is provided, which can be run to the floor and there fastened to a ring by a snap hook. The helmets are covered when not in use by a canvas bag to protect them from dirt. A work bench can be placed at one side of the car, and equipped with suitable tools needed for repair work in connection with the rescue apparatus.

RESCUE EQUIPMENT

Each station is provided with an equipment of five Fleuss, five two-hour Draeger, three one-half hour Draeger and three Westphalian oxygen rescue apparatus, with two oxygen pumps and a complete outfit of electric and ordinary safety lamps, together with appliances

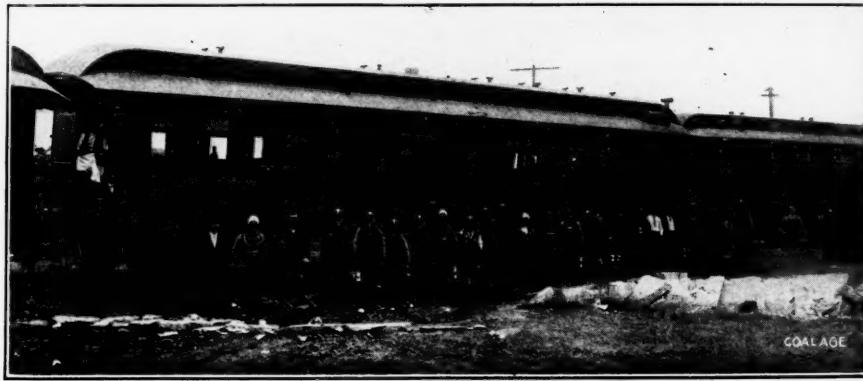


FIG. 3. PARTY OF RESCUERS EQUIPPED WITH OXYGEN HELMETS

them all, although there are slight differences in interior arrangement. One of these cars, completely equipped, was donated by the Chicago, Milwaukee & St. Paul Ry., and another, fully outfitted, was presented by the Chicago & Northwestern Ry. The third was purchased from the Pullman Co., and refitted by the commission.

As shown by Fig. 5, one end of the car is occupied by the heater, coal box and the locker for linen, and on the opposite side of the aisle is the toilet room. Next come three double-compartment berths on each side of the car. There are accommodations in this section for 12 persons, sleeping singly. Next is a kitchen, fitted with stove, sink and a suitable pantry. An ice box is located beneath the car. The state room, intended as an office for the manager, or whoever is in charge of the rescue work at the mine, contains a double berth, a desk and a small toilet room. One end of the car is used for

for charging the electric lamps. There are also two complete sets of first-aid appliances, charts, etc. Some of this apparatus is kept stored in each car so that in case of an accident at a mine in the district tributary to the station, the car can be moved as soon as a locomotive can be procured.

Each station is in charge of a superintendent and an assistant. There is a manager who has charge of all the stations and cars and acts in conjunction with the commission.

The course of training consists in acquiring a knowledge of the several types of apparatus noted above and the acquirement of facility in the use of the same. Before a certificate is granted, a man must undergo the following test, completing the work within a period of two hours:

1. Make eight complete trips around gallery on ground floor.
2. Climb ten times over an overcast.

3. Carry 25 bricks over same.
4. Crawl through tunnel three times.
5. Carry four props over overcast.
6. Saw two props completely across.
7. Set five props and knock them out.
8. Hang canvas, take it down and fold it up.
9. Pull weight 60 times.
10. Carry dummy, with the assistance of another man, once around gallery, lifting it over a car.
11. Push car once around gallery with help of an assistant.
12. Make eight complete trips around gallery on ground floor.

When a man can do this a certificate is given him and also a button, showing him to be a member of the Illinois Mine Rescue Corps.

The time of training varies from one to two weeks, depending upon whether the men devote all their time to the training and live in the station during that period, or come to the station from adjacent mines and devote only such time as they can spare from their regular duties. No charge is made for instructing the men and if they desire, 12 men at a time can be lodged in the dormitory free of charge. The superintendent has the privilege of running a boarding table for which those in training pay. They can board outside the station if they prefer to do so.

The mining law passed by the legislature recently adjourned provides that a map of each mine in the state shall be filed with the manager of the rescue stations. The maps of the mines situated nearby any station will be kept in that station so that in case of an accident the rescue party can study the map while *en route*.

The same law provides that candidates for the positions of mine inspector and mine manager must pass an examination in rescue and first-aid methods.

CERTIFICATION

The stations and cars were not completed and fully equipped until about June 1, 1911. The summer of last year was so intensely warm as to render it inadvisable to attempt to train men at that period of the year. The helmets on a sultry day cause considerable oppression, and the heat would be still further increased by the combustion of the sulphur. With the return of cool weather, however, a vigorous campaign has been inaugurated and the three rescue cars are now in the field, going to the various mining centers for purposes of demonstrating the use of apparatus and for giving systematic instructions in the same. A record is kept of those who take such instructions and they are given credit for having attended these demonstrations and lectures when they go to any one of the stations for final training and for the test required before a certificate and button are

granted. Up to Dec. 1, somewhat over 100 certificates had been issued to men scattered all over the state, but this number will be materially increased as the result of the active campaign now being conducted.

In each of the stations there is kept a file of the leading mining technical journals of the United States and Great Britain and there is also a mining library.

It is a source of pride to the citizens of Illinois that the state has been the first to provide a rescue service for its mines under state jurisdiction and it is believed that this is to be only part of a general educational movement that will greatly benefit the mining industry of the state.

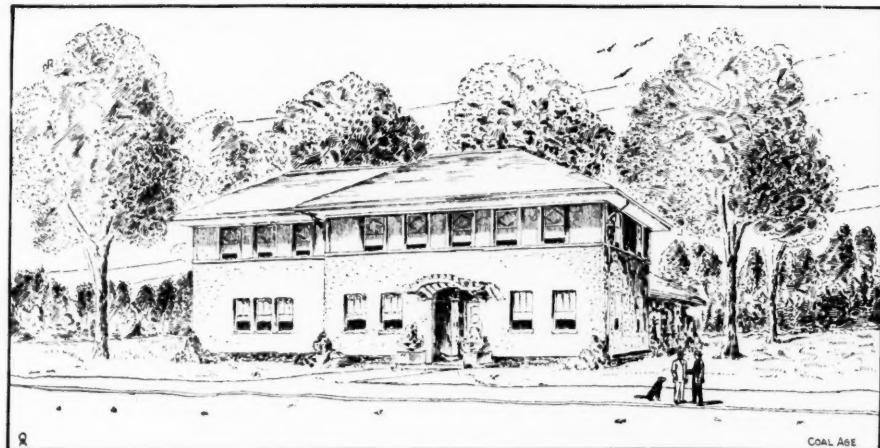


FIG. 4. STANDARD DESIGN FOR ILLINOIS MINE-RESCUE STATIONS

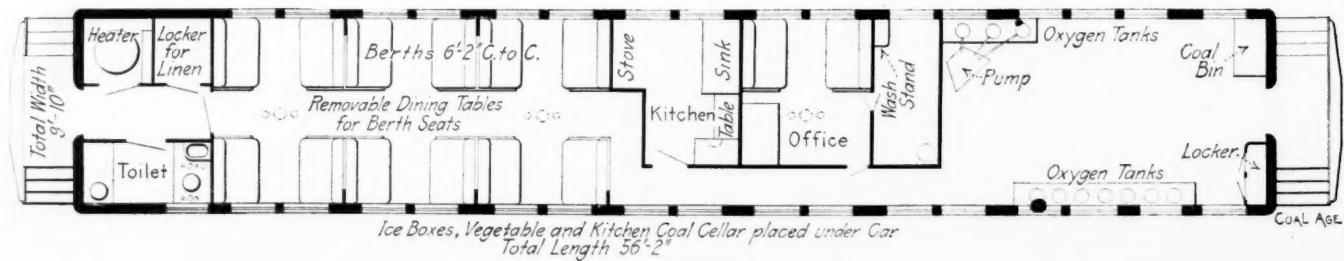


FIG. 5. STANDARD PLAN OF MINE-RESCUE CARS FOR STATE OF ILLINOIS

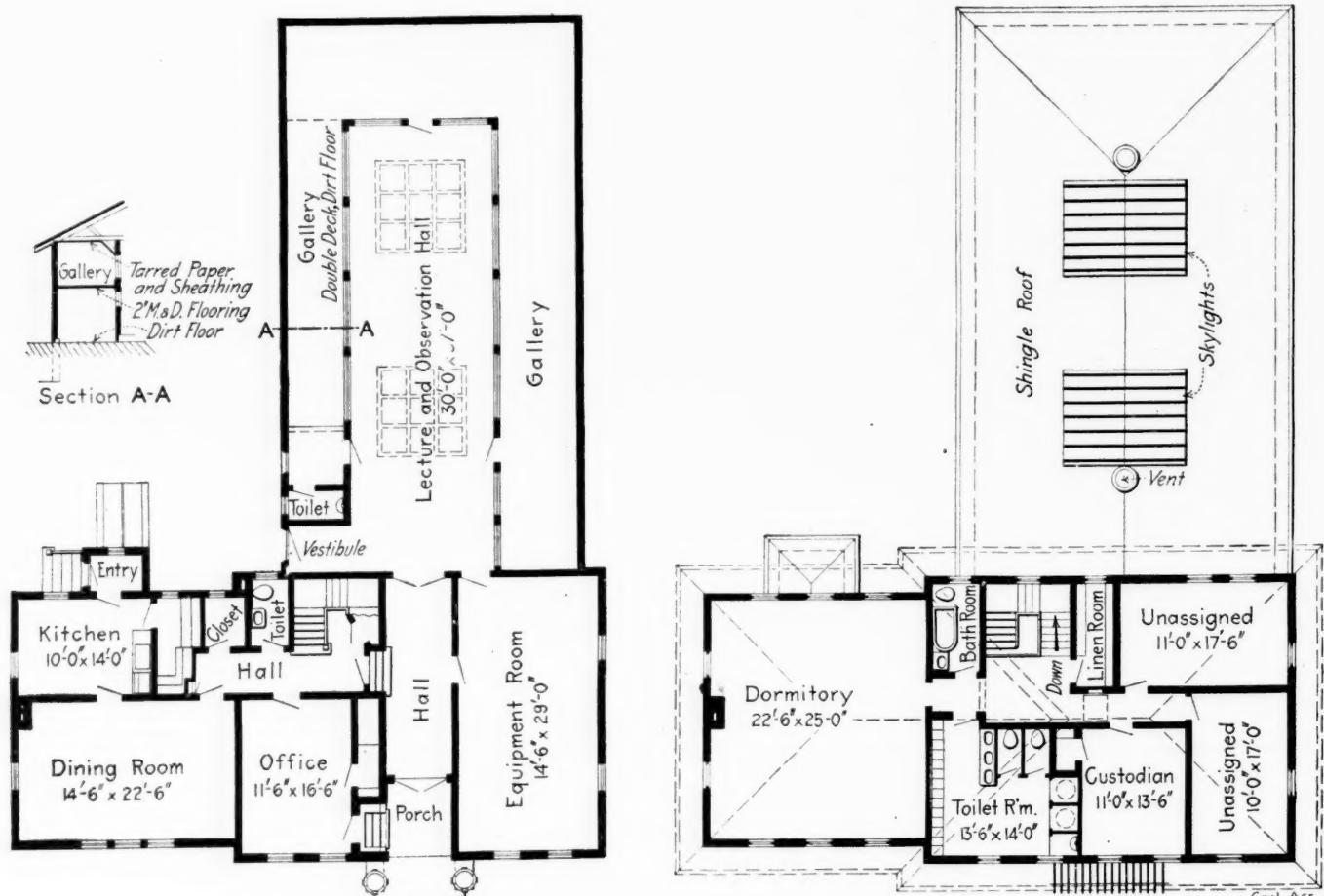


FIG. 6. PLANS OF RESCUE STATIONS AT LA SALLE, BENTON AND SPRINGFIELD, ILL.

Anthracite Coal Strike Situation

Much has been said and written about the all absorbing topic for discussion which is now agitating all parties in the anthracite coal fields. The oft repeated question is, will the miners strike on April 1? The thoughtful reader is at a loss to sum up the situation for he has reluctantly formed the opinion that the average writer is biased in his views, be he a labor leader or a spokesman for one of the coal-producing companies.

The time is near at hand when an answer must be given to this momentous question which is of vital importance to the large coal-producing corporations and to the 160,000 men and boys employed by them in the production of anthracite coal for the market. It is a question of deep concern to over 1,000,000 people populating the anthracite coal fields and directly or indirectly dependent upon the unceasing production of coal for their means of livelihood and prosperity.

By E. L. Cole

The miners in the Union constitute a minority of the anthracite coal workers, but they will control the actions of both unionists and non-unionists. Violence will probably not effect anything in the coming strike. The washeries and stock piles are mostly away from the villages of the coal workers and the operators will be able to supply all normal demands.

have asked them: Why do you say "they," I have invariably received the reply that, "I don't belong to the miners organization, but if the United Mine Workers of America decide to strike I will strike with them."

ously object to any such measures being applied to them in their political activities. Surely they are not to be congratulated on the consistency of their actions.

The truth of the matter is that the majority of the mine workers have long ago severed their relations with their economic organization; they have little or no confidence in the mine leaders, and they have good reasons for that lack of confidence. They have seen their officers spending valuable time and money, jockeying for positions of influence and ease in the labor world. They have seen them conducting elections in an unscrupulous manner. They have seen their lesser officers spending their time and the money filched from the pockets of the mine workers, in the saloons of the coal fields in much the same manner as a ward politician whose whole purpose in life is to perpetuate himself in power



COAL AGE

ONE-HALF MILLION MEN ARE REQUIRED TO MINE THE COAL DEMANDED FOR CONSUMPTION IN THIS COUNTRY ALONE

I shall state what I have seen and heard, so that all who have the well being of their fellow creatures at heart, will be able to draw their own conclusions with the assurance that the verdict is based on the actual conditions that confront the miner and his employer today.

THE LEADERS AND THE LED

In conversation with the more intelligent mine workers, whom it is my good fortune to know well, I have heard slip quite often from their lips the expression: "Well! if they strike." When I

here it may be well to point out that while public opinion is overwhelmingly against a strike, that same public opinion will not decide the question, neither will the majority of the miners decide it, for the issue will be wholly in the hands of a small but powerful minority of coal miners, not powerful in money and numbers, but powerful in influence. What they decide to do, the vast army of mine employees will choose to do also. The miners are permitting themselves to be governed by a minority of their fellows in the economic field, while they strenu-

so that he may continue to live on the sweat of his dupes.

UNION STRONGER IN INFLUENCE THAN FUNDS

The position of the miners is rendered difficult by the fact that less than 30 per cent are in good standing in the labor unions, so that the treasury is far from overflowing. Thus the miners' ranks do not present an unbroken front to their employers. And this is due in no small measure to the fact that race prejudice is an active factor separating the mine

workers. It is well known that nearly all the organizers receive comfortable salaries, far more than they would receive in their usual vocations at the mines. They are nearly all of the English-speaking races, although the financial support of the Union is drawn in the anthracite field from the foreign miner. It is the foreign workmen who are now the aggressors. They are believers in *direct action*, and they point with pride to their remarkable achievements in 1902 when they marched in bands 10,000 strong having base-ball bats as weapons. By threats of physical violence they succeeded in closing one colliery after another, regardless of the fact that some of the mines were manned entirely by Americans who preferred not to belong to the union and whose wish it was to continue at their work of producing coal.

The tactics which are known in the labor world as *direct action* were in no small measure responsible for the mines being tied up for nearly six months in 1902, and some of the miners have expressed the hope that they will be able to repeat their tactics and again tie up the mines until their demands are granted.

A NATIONAL COAL STRIKE

Some profess to see a gleam of hope in the plan of ex-president Lewis who is advocating a united stand of both the bituminous and anthracite miners. He would cause the entire organized army of soft-coal workers to stand idle until the demands of the hard-coal workers were granted, regardless of the fact that the bituminous miner may have previously succeeded in reaching an amicable agreement with his employer. The futility of such a plan is evident to the student of the labor movement for there are in this country in round numbers 800,000 mine workers, less than half of them are organized and in the event of a strike, the unorganized soft-coal miners would undoubtedly continue at work, thus enabling the operators who employ them, to capture markets permanently that are now held by the employers of unorganized labor. For it is no secret that we are able today to supply coal far in excess of the actual market demand. Thus the union miner, in the soft-coal region, if he stood idle for the sake of his anthracite brother would be placed in the position of robbing himself for the sake of affording the anthracite leaders an opportunity to experiment with the system euphemistically termed *direct action* but better termed *unrestricted violence*. The fact that a large body of miners would still continue at work would be a most formidable obstacle in the path of organized labor. Its leaders see the danger that lies ahead in case of a general strike, and they are adverse to it, although they are being daily urged to promote it by those who favor the plan

and who point out the gains made by the English labor men in their recent general suspension from work.

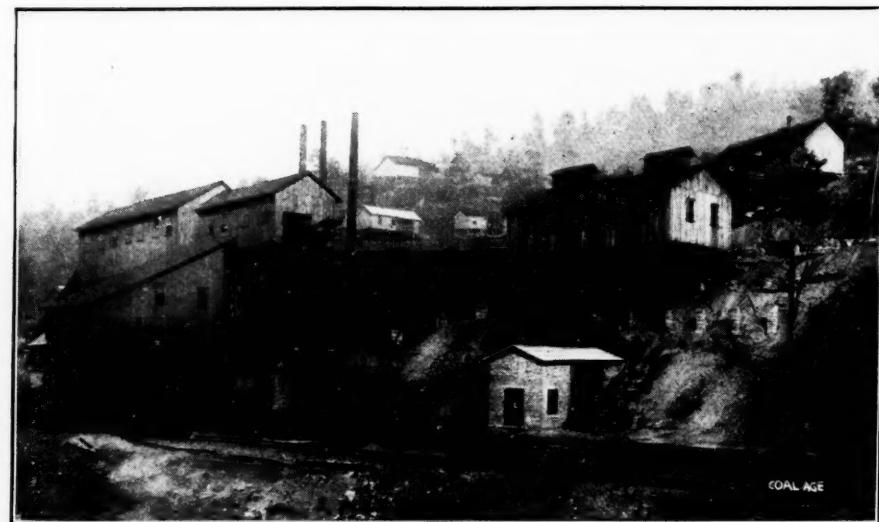
LACK OF COHESION

The miners seem to lose sight of the fact that the English labor movement is conducted by people who speak a common tongue, while here we have the most cosmopolitan body of men ever gathered together, men who differ in race, and who hold political opinions which are at variance one with another. As proof, witness the acrimonious debate which lasted more than one day at the recent convention of the U. M. W. of A. The wrangle was precipitated by the introduction of a resolution to indorse a political party, the tenets of which most of the miners do not in any way understand.

to a successful conclusion is but an iridescent dream into which they have been hypnotized by a western labor leader. He is now in charge of the general strike of the New England mill workers; but recently he toured the coal fields rousing his audiences to a high pitch of enthusiasm by his glowing word-pictures of the possible fruits of a general strike. I have been advised that it is his intention to return to the coal fields if the strike ensues, for the purpose of promoting that general strike, of which he is such a strenuous advocate.

TEMPORARY VOCATIONS

Some of the miners profess to believe that they can repeat their migrations of 1902 when thousands of them entered the industrial centers and readily secured



IN CASE OF A PROLONGED STRIKE, THE WEST VIRGINIA MINES WOULD GREATLY BENEFIT. ABOVE VIEW SHOWS SUN COLLIERY NO. 1, IN THE NEW RIVER FIELD OF SOUTHERN WEST VIRGINIA

Furthermore, a general strike to be successful would necessitate the aid of the railroad men engaged in transporting coal to market. These men would be unable to aid the miners unless they first would repudiate the contracts they have entered into with their employers, and it is worthy of note that no body of railroad men in this country has yet disdained itself and the calling by repudiating its contracts. These have been secured only after years of earnest effort. By them railroad employees have practically eliminated the use of that crude weapon—the strike—in their efforts to improve the condition under which they labor.

It would undoubtedly prove a most arduous task for the miners to convince their fellows who are engaged in the transportation world to desist from hauling coal from either storage yards or washeries for the purpose of enabling the miner to defeat his employer.

The hope of the miners that they can inaugurate a general strike and carry it

employment at wages that enabled them to support themselves and assisted them in supporting their families at home. Those who hold such an opinion should be disillusioned, for the student of industrial conditions is aware of the fact that large employers of labor are not in need of additional hands today. Few, if any, of our large industries are being operated to their full capacity, and in no quarter is the demand for material greater than the supply.

The strike of a decade ago was but six weeks old when the public was asked for financial assistance and most liberally did it respond, but today an appeal for a sustenance fund would fall unheard, not because of the unwillingness of the toilers in other fields, but because the head of the average family has little or no money to bestow upon others, due to the world wide increase in the cost of living. Moreover the large body of men who are unsteadily employed will be unable to assist their fellows should they so desire.

PUBLIC NOT ANXIOUS TO PAY MORE FOR COAL

The aid received from the public was in no small measure responsible for the fact that the miners were able to win their strike of 1902. The coal-producing companies were not engaged in producing coal for pleasure, so they added the increased cost of labor to the selling price of coal, which action the public immediately resented. The consumer was placed in the position of the innocent bystander who attempts to interfere in a family disagreement. The reconciliation was indeed effected but at the public cost. The coal buyer will be loath to aid the miner again for he will be aware that the inevitable result will be to increase the cost of an article which forms one of his daily needs. The managers of the vast anthracite coal operations must decide to raise the price of coal if they would hope to continue to realize an equitable return on the extra hazardous investment that they have made.

ten years ago and march to the washeries in an effort to stop their operation, they would undoubtedly be met by the highly efficient Pennsylvania State Constabulary. The force has been in existence long enough to demonstrate that it is equal to any emergency which may arise. It may be added that the present force of state police may be insufficient to cover the entire zone of labor troubles, but it is well to remember that as there is a community of interest between the coal, railroad, manufacturing and commercial men, it would not be an insurmountable task for them to unitedly invoke the aid of the state legislature of Pennsylvania to increase the numbers of the state police, provided that they produce data to substantiate their claims for additional protection. To those of my readers who may doubt the foregoing, I need but point out that only the united action of the Pennsylvania business men prevented the disintegration of the state police. In the last session of the legis-

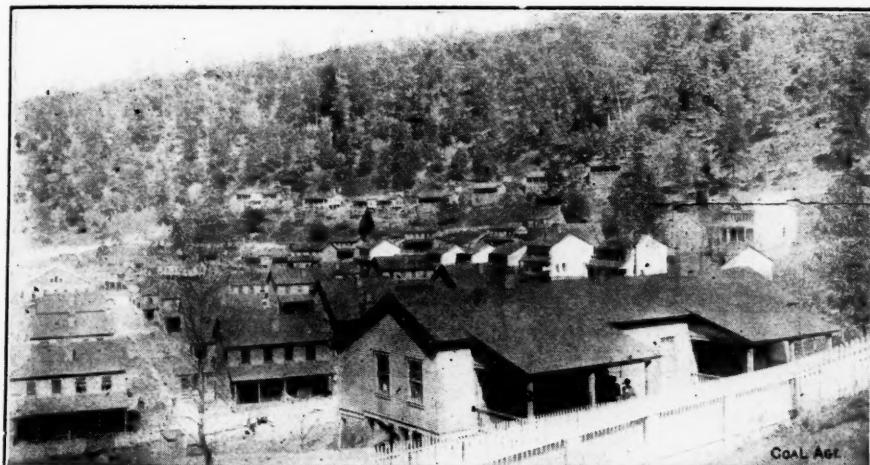
have chosen the locations of most of the yards within the reach of the consumer, out of the zone of possible labor troubles. It has been estimated that the operators will have sufficient coal on hand, together with the possible output of their washeries, to supply the normal demand for coal.

It is this strategic position of the operators that has given rise to a fear of a lock-out of the miners on Apr. 1, but the student of economic conditions quickly sees that a lock-out is not without its perils to the mine owners. For instance, every summer all the progressive gas companies inaugurate strenuous campaigns for the substitution of gas ranges for anthracite-coal consuming stoves. In the fall of the year the central stations, who quite frequently are large users of bituminous coal, endeavor to supply customers for their winter heating from their central stations, and this phase of the problem is one fraught with the danger of no slight economic loss to the coal-producing companies, and one that could hardly be avoided if a protracted struggle should ensue.

HIGHER COSTS FOR MINER AND OPERATOR

Though the operator occupies an excellent strategic position, his path is not an easy one, and the question for him to decide is what course shall he pursue so that he may continue to keep his property on its present dividend-paying basis. While it is true that the miner has suffered an increased cost of living, the operator has also suffered from progressive increase in the cost of mine supplies during the past nine years, in addition to which he has been compelled to make heavy expenditures for the purpose of mining seams of coal which lie deeper than he has formerly worked, and that hitherto have remained untouched, due to the enormous cost of reaching them.

It has been said that the miners and mine owners might agree to a slight increase in the compensation of labor, the operators to add to that increase a sum of money to compensate them for the higher wages and heavy expenditures heretofore mentioned, but a student of the situation realizes that competition is liable to make the problem more difficult, for, though the increase be only 10 per cent., the additional cost would be sufficient to cause many large consumers of anthracite to substitute bituminous coal, so that both miner and owner would, by such measures, receive no permanent gain. There is the further danger that harassing legislation may be invoked by the politicians who wish to make a play to the gallery, hoping thereby to further their personal political ambitions. Undoubtedly an increase in the cost of coal will bode ill for the operators if the political agitator should seize the opportunity and succeed in further inflaming the public mind against industrial corporations.



TYPICAL MINING TOWN IN AN UNORGANIZED WEST VIRGINIA FIELD

There is another factor that will militate against the miners, and that is the great increase in the machinery used in the washeries. This replaces unskilled men by mechanics, who being fewer in number and less sympathetic with the miners, are more likely to continue at work. In fact, a few years ago when the U. M. W. of A. ordered a stoppage of work pending negotiations, General Manager Richards of the Philadelphia & Reading Coal & Iron Co. was able to ship 40 cars of coal per day from Rausch Creek washery, without the use of any regular employees with the exception of the foremen, due to the fact that the work is almost entirely done by automatic machinery. The total tonnage of all the washeries, together with the coal in the storage yards, would enable the operators to prevent the repetition of the famine of 1902.

DIRECT ACTION FORE-WARDED

Should the miners in the event of a strike attempt to repeat their tactics of

lature, efforts were made to prevent an increase in the salaries of the members of the force, which was only an indirect attempt to cause a depletion in the ranks of the state police. It may be well to further note that the fight against them was led by one of the state leaders of the American Federation of Labor, who recently toured the coal fields at a salary almost double that which he receives as a pipe cutter. The burden of his lecture was a recital of his efforts to legislate the state police out of existence, and he proudly proclaimed that he would abolish the most expensive but effective preventative of mob rule that the State of Pennsylvania ever possessed.

STORAGE YARDS LARGELY AWAY FROM COAL FIELD

Turning to the operators, we find that the struggle of 1902 taught them the necessity of building storage yards so that they would not be entirely unprepared to meet their employees in future struggles in the economic field, and wisely they

British Coal Trade Crisis

SPECIAL CORRESPONDENCE

Having regard to the world-wide interest in the negotiations between the coal owners and the representatives of the workers to establish the principle of the minimum wage in British coal mines, it may be opportune to append a diary of the crisis as follows:

Oct. 7, 1911—Annual conference of Miners' Federation. Conference met at Southport and resolved to "take immediate steps to secure the individual district minimum wage." In the event of the employers refusing, Rule 21 to be put in operation.

Oct. 14-30—Minimum-wage demands were refused by the employers in all districts except Warwickshire.

Nov. 10—The minimum-wage demand was considered by the Conciliation Board for the federated districts of England and North Wales (Lancashire, Cheshire, Yorkshire, Midlands, Somerset and North Wales). The coal owners' representatives stated they could recommend the adoption of the principle of the minimum wage; but as the matter was beyond their power to decide, they proposed to take it to their districts. The meeting was, therefore, adjourned.

Nov. 14 and 15—As arranged, on Oct. 7, a special conference of the Miners' Federation was held in London. In view of the acceptance of the principle of the minimum wage by the coal owners' representatives in the English area, it was decided to adjourn the conference, pending further efforts to promote a settlement. The executive was instructed to invite the coal owners generally to a national conference.

Dec. 18—On this date the English Conciliation Board again postponed decision on the question at issue.

Dec. 21—The adjourned conference of the Miners' Federation decided to take a ballot of the men as per Rule 21. Each county or district was instructed to prepare a schedule of demands. Decision made to continue negotiations.

Jan. 10-12, 1912—Ballot of workmen taken.

Jan. 13—The country realized that the strike majority would be more than the two-thirds required by the Federation rules, and there was a sharp rise in coal prices.

Jan. 16—A meeting was held of the miners' representatives on the English Conciliation Board to frame proposals for the practical application of the minimum wage to coal mining.

Jan. 17-19—The Miners' Federation held a conference at Birmingham. The ballot result was announced, showing 445,801 in favor and 115,919 against a strike—majority, 329,882. In view of these figures it was decided to issue

strike notices. At the same time the employers were invited to continue negotiations.

Jan. 23-27—The negotiations were continued by the English Conciliation Board conference. The task of finding a basis of settlement was delegated to a joint subcommittee. This joint committee exchanged views upon the demands of the miners, with reference to abnormal places and the minimum wage. It was decided to submit a report to the owners and miners in the different districts within the federated area.

Feb. 1—Notices handed in at collieries in South Wales coal field to stop work at the end of February, a month's notice being necessary under the South Wales wage agreement. On behalf of the members of the Enginemen, Stokers and Surface Craftsmen's Society, who demand an eight-hour day and better wages, notices were tendered. The number of workers affected by the notices is about 200,000.

Feb. 1-2—Delegates of Miners' Federation, representing over 650,000 men, passed resolutions upon the minimum wage to furnish basis upon which negotiations may be conducted in the national conference of coal owners and workmen, on Feb. 7. Agreed that the following claims be formulated for an individual minimum wage in each district for piece-workers at the face of coal:

Yorkshire	7s. 6d. ¹
Lancashire	7s.
Midland Federation	6s. @ 7s.
Derby	7s. 1d. @ 7s. 6d.
Nottinghamshire	7s. 6d.
North Wales	6s.
Leicestershire	7s. 2d.
South Derby	6s. 6d.
Somerset	4s. 11d.
Bristol	4s. 11d.
(While this is fixed as a minimum, it is understood that it will not effect in any way a higher rate than 5s. and 5s. 3d. already prevailing in the coal field).	
Cumberland	6s. 6d.
Scotland	6s.
South Wales	7s. 1d. @ 7s. 6d.
Northumberland	6s. @ 7s. 2d.
Durham	6s. 11d.
Forest of Dean	5s. 10d.
Cleveland	5s. 10d.

¹For the information of those who are not familiar with English money, we desire to say the English shilling (s.) equals 24.3c. and the pence (d.) equals 2c.—EDITOR.]

No underground adult worker shall receive a rate of wages less than 5s. per shift (but this resolution is not to apply to Somerset, Forest of Dean, or Bristol).

Individual minimum wages for all piece-workers, other than those working at the face of coal, to be arranged by the districts themselves, and to be as near as possible to the rates paid at the present time in each district.

The rates paid to the underground workers who are paid by day wage left to the districts to arrange.

List of boys' wages also left to the various districts, but they are not to be less than present wages nor in any case less than 2s. per day for any boy.

Conference of the Federation to be called to meet in London, on Feb. 13.

New Test for Firedamp

A simple contrivance which is capable of being attached to any safety lamp has been designed by Henry Briggs, of the Heriot-Watt College, Edinburgh. By means of his device he claims that a remarkably small percentage of firedamp can be detected in mine air, that indeed, it is one of the most accurate and delicate ways of detecting gas.

The attachment, he explains, consists merely of a loop of copper wire supported on a vertical brass stalk, which extends through the oil vessel of the lamp. When it is required to make a test for gas, the loop is moved into the flame, which then becomes nonluminous, allowing the gas cap to be clearly seen if firedamp be present. The loop obviates the necessity of drawing the flame down when looking for gas; hence there is no risk of losing the light.

Changing from a working to a testing flame, or vice versa, is practically an instantaneous operation. Any kind of oil or spirit and any shape of wick may be used. The loop does not interfere with the lighting power of the lamp, nor does it curtail the height of the flame when testing.

On John Bull's Toes?

The following editorial excerpt from the *Iron and Coal Trades Review* (London, England) is a graceful—though apparently unwilling—acknowledgment of our growing importance in the export trade:

A generation ago, British coals were thought to be practically beyond the reach of competition, and the only preoccupation of collieries and shippers was to anticipate the requirements of a trade which seemed capable of indefinite expansion, and which, indeed, is still expanding. It is true that exporters had been made to realize the existence of coal in America by the loss of the West Indian trade, but this was soon all but forgotten in view of the rapid increase in the quantities taken in other directions. The knowledge of the existence of coal deposits in other countries was of the vaguest character, and the subject was casually dismissed by an emphatic declaration that they were of no account in a competitive sense, and developments on the Continent, as in the United States, were treated with indifference until British shippers were startled some 10 or 12 years ago by the invasion of European markets by American coal in small quantities.

Coal Production of Austria

The total production of both coal and lignite in Austria for the year 1911 was 40,116,743 metric tons, as compared with 38,006,840 tons for the year of 1910. The coke production for 1911 was 2,076,978 metric tons, as compared with 1,999,106 tons for the year of 1910, the production of briquettes in 1911 was 347,597 metric tons, an increase of 13,379 tons for the year. Two-thirds of the briquettes were made from lignite.

A Self Dumping Car Haul System

The Philadelphia & Reading is the first company to install the Greene self-dumping car haul in the anthracite regions and C. O. Bartlett & Snow Co. have but recently finished one of the finest jobs of engineering in Pennsylvania, in adapting the patented idea to local conditions found at the Burnside colliery. The accompanying illustration conveys an idea of the old plant, which was displaced, and shows two loaded cars being elevated while two empties are being lowered on the parallel track.

This is the simple plan of cable haulage found in so many mines everywhere. It will take up enough cars and does a service quite adequate in most instances, but a much greater economy can be

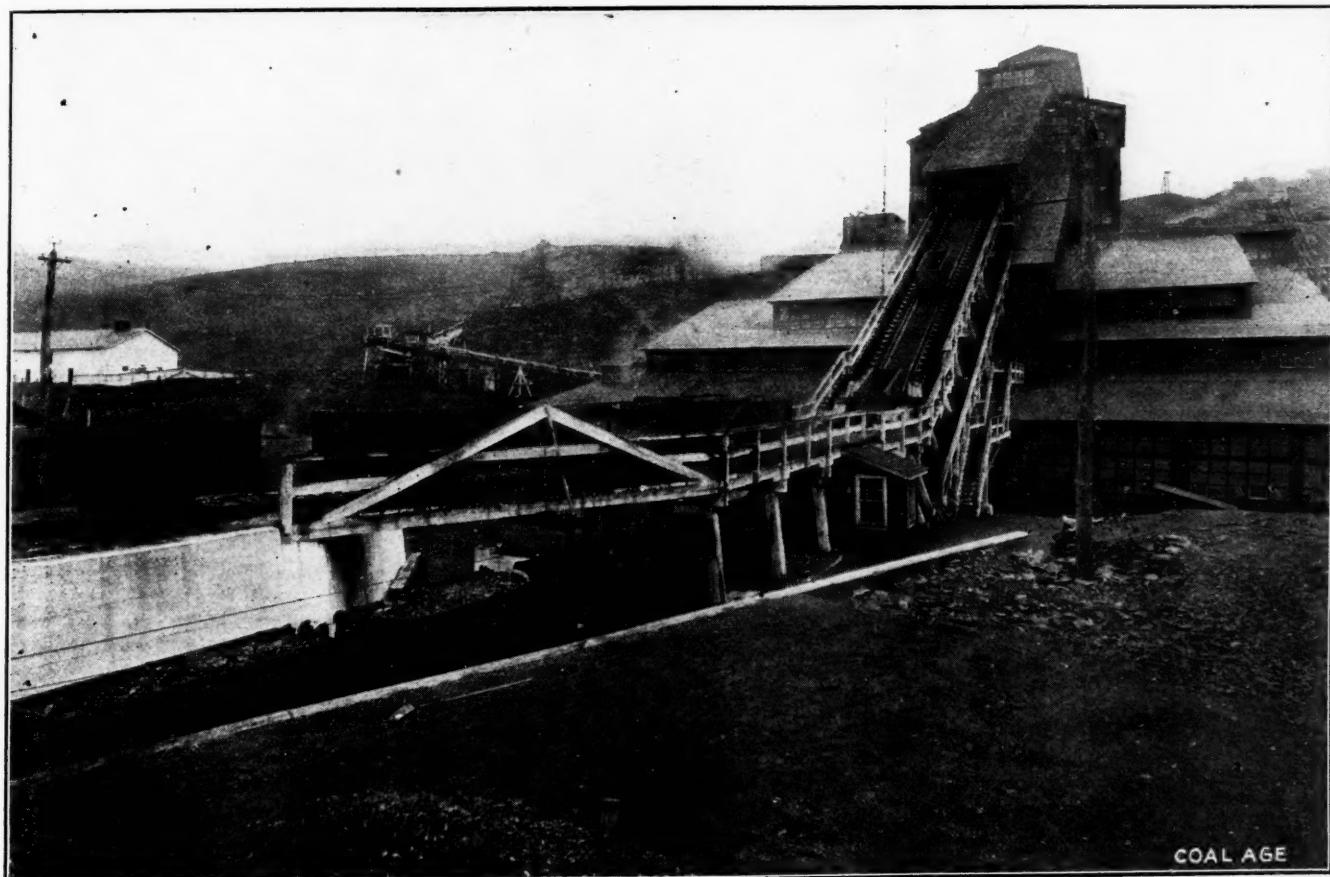
Special Correspondence

A description of the Greene car-haul and automatic-dumping system as installed at the Burnside colliery in Pennsylvania. The apparatus includes a novel arrangement for recording the work of the tipple and is an important labor-saver.

dumping car haul will do this and more. Variable speed motors furnish the power to run the haul from 44 to 88 ft. per minute, hence a shut-down in the breaker can be compensated quickly by speeding

makeup of the machine, which is simple enough despite the wonderful results that it will accomplish.

It is simply an endless chain revolving about a sprocketed wheel at either end of two tracks placed one above another, the chain having protruding cross bars that engage a loaded car behind its rear wheels and after having slightly elevated it to accommodate the 30° grade and avoid spilling coal in the ascent, it goes to the breaker. Then a swinging lift, which is not such a simple matter and requiring description later, elevates the car, as it is discharging its load of about four tons of coal, and placing it on the upper track leaves it to the cross bar to return again to



COAL AGE

INSTALLATION AT THE PHILADELPHIA & READING COAL & IRON CO.'S BURNSIDE COLLIERY

effected by the use of the installation to be described.

METHOD OF OPERATING

The Burnside breaker receives coal from three openings namely Burnside shaft, Burnside drift and Stirling slope. Tracks approach the breaker from three directions around curves and limited space for track storage of waiting cars demands speedy handling of the loads and empties to keep the several workings clear at all times. The new self-

up the haul and quickly reducing the accumulation of loaded cars.

To describe the principle of the Greene self-dumping car haul in the simplest manner, it might be likened to a common type of bucket conveyor, as it has the same endless chain, though lacking buckets of the stationary character, which are supplied by cars as they are taken up at the bottom on the lower track and released at the base of the upper track. Illustrations are given herewith to help understand the general

the tracks leading back to the mines. Beside the swinging lift there is another auxiliary device at the base that prevents choking, called the feeder haul, and one other mechanism just above it, known as the cross bar and empty car release that operate automatically also and are worthy of description.

FEEDER HAUL

The feeder haul is a machine in itself consisting of an endless chain on two sprocketed wheels geared to the larger

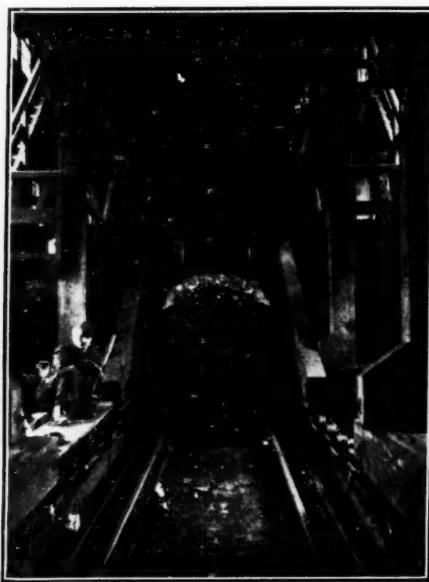
sprockets that operate the main haul. The chain has two swinging catches or dogs that perform the functions of feeding cars into the main haul when coming in contact with three pieces of cam track that raises behind the car axle and pushes it forward at the proper interval and releases it again to wait for the next cross bar.

To be exact, we will follow the process of cars going over the feeder haul. As the train approaches, the head car is caught by a dog standing erect and passed forward to where a man pulls the coupling pin. At this point, let us note that this is the first man to have anything to do with the machine and remember that there is just one other man

discharging begins with the door partly opened and continues as the car moves up the curved elevation until empty. The several types of cars have been taken into consideration, a cam track being furnished for lift end cars (though this is not the type at Burnside) so a projection on either side of the car trips the catches and the door swings open. At the same time the car notifies the swinging arm lift that it is coming and by the same automatic devices the lift, which really consists of two parallel arms is thrown in gear and receiving the emptied car, raises and places it on the upper track and the cross arm, now in front, checks

bar must be removed from under the wheels and the break in the track closed for the car's passage.

The important principle in this operation is that of a balanced track and a corresponding cam release device. Remembering that the car track is within the track traversed by the cross arm wheels, we have the upper end of the balanced track elevated as the car descends hence it stops the car and the cross arm being free, slips beneath the balanced track to catch the release that trips the balance downward and cars pass on to tracks as desired. The cross arm has now made its trip and proceeds to repeat the process, while the balanced



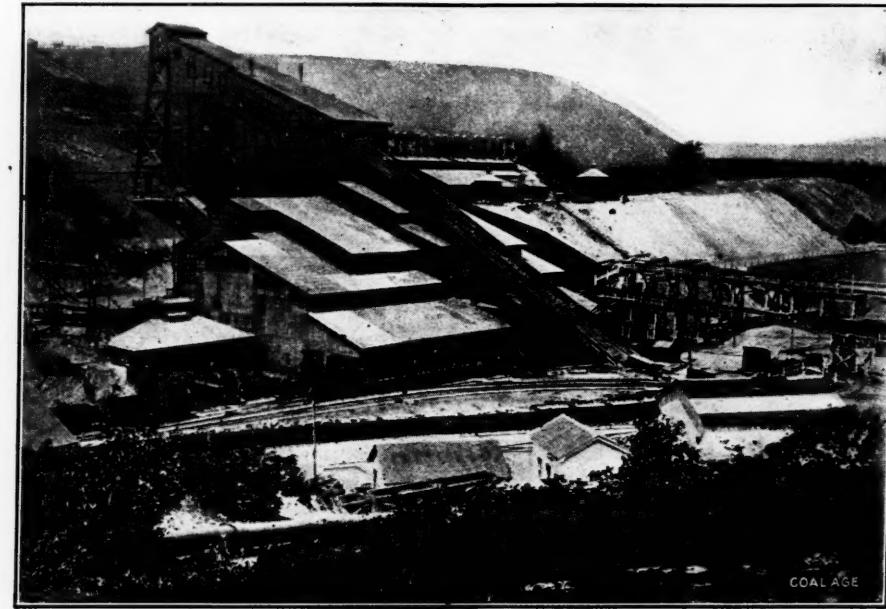
AUTOMATIC TIPPLE

about the entire haul. This latter man has little to do but stand guard at the top, but that is necessary and when compared with the number of men used on the former car haul, a great saving is represented in wages alone.

After advancing the car to about the center of the feeder the dog is dropped to be raised again a few feet ahead to advance the car left in mid track last trip, till it is taken up by the cross bar and sent up the incline. This cross bar is a tubular axle extending beyond the car wheels, and having wheels which run on a track of their own. It is impossible for the cross bar to miss its hold or for cars on the feeder track to interfere with its functions because of the simplicity of the accessory parts and by reason of a bumper that automatically checks waiting cars. Nor is the feeder haul a necessity as the cars can be fed by hand.

DUMPING ARRANGEMENT

At the head of the haul the swinging arm lift comes into play by throwing the catch on the car door so that



THE OLD INSTALLATION WITH PARALLEL TRACKS

its descent by gravity down the incline to the mine tracks.

Here again the entire process is automatic and the man shown in the illustration is doing what he does most of his time except in case of emergency resulting from interference in some part of the breaker or about the mines. An intelligent boy may do as well, as all that is required of him is to throw the switch that starts the electric motors when they may have been cut off by safety switches at the bottom or other places in the system since this provision has been made for fool protection and in case of unforeseen emergencies. The power can be thrown off anywhere but can only be turned on at the head and only there when all other switches are closed indicating that everything is all-right along the entire line. The man at the head therefore is merely the watchman and acts cautiously and only on authoritative instructions.

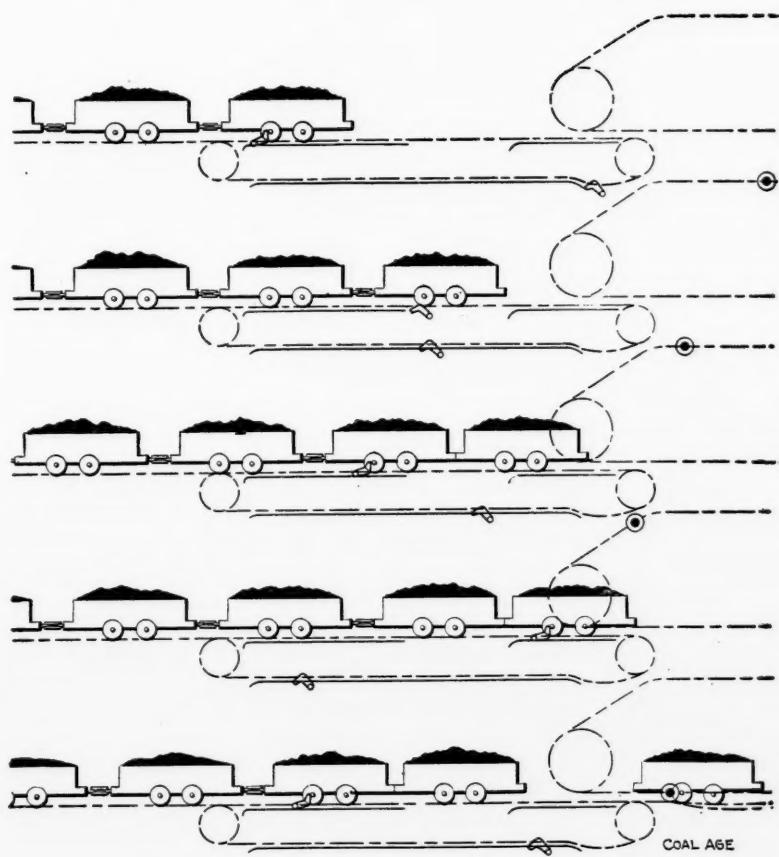
In the Greene method the car must pass through one more important process before getting out of the system at the base of the incline, where the cross

track is thrown back into position by the weight of the car passing over it.

THE AUTOMATIC RECORDING SYSTEM

These are the main features, but there is more and to the operator the remainder is of even greater importance than the rapid despatch of 120 to 130 four-ton cars per hour, employing the services of two men, with safety provided for both men and equipment, and the assurance that the machine on the job is equal to all emergencies without extraordinary exertion.

The most valuable part about this invention is its reliability in recording its own work and affording means of detecting the responsibility for its shortcomings. If the average of its performances is not lived up to there has been a way provided for telling who is to blame and somebody has to account for it. Electrically operated Bristol recording dials tell the tale. In the morning the red finger on the clock dial tells the hour and minute of first movement and the "carpet" awaits an explanation for

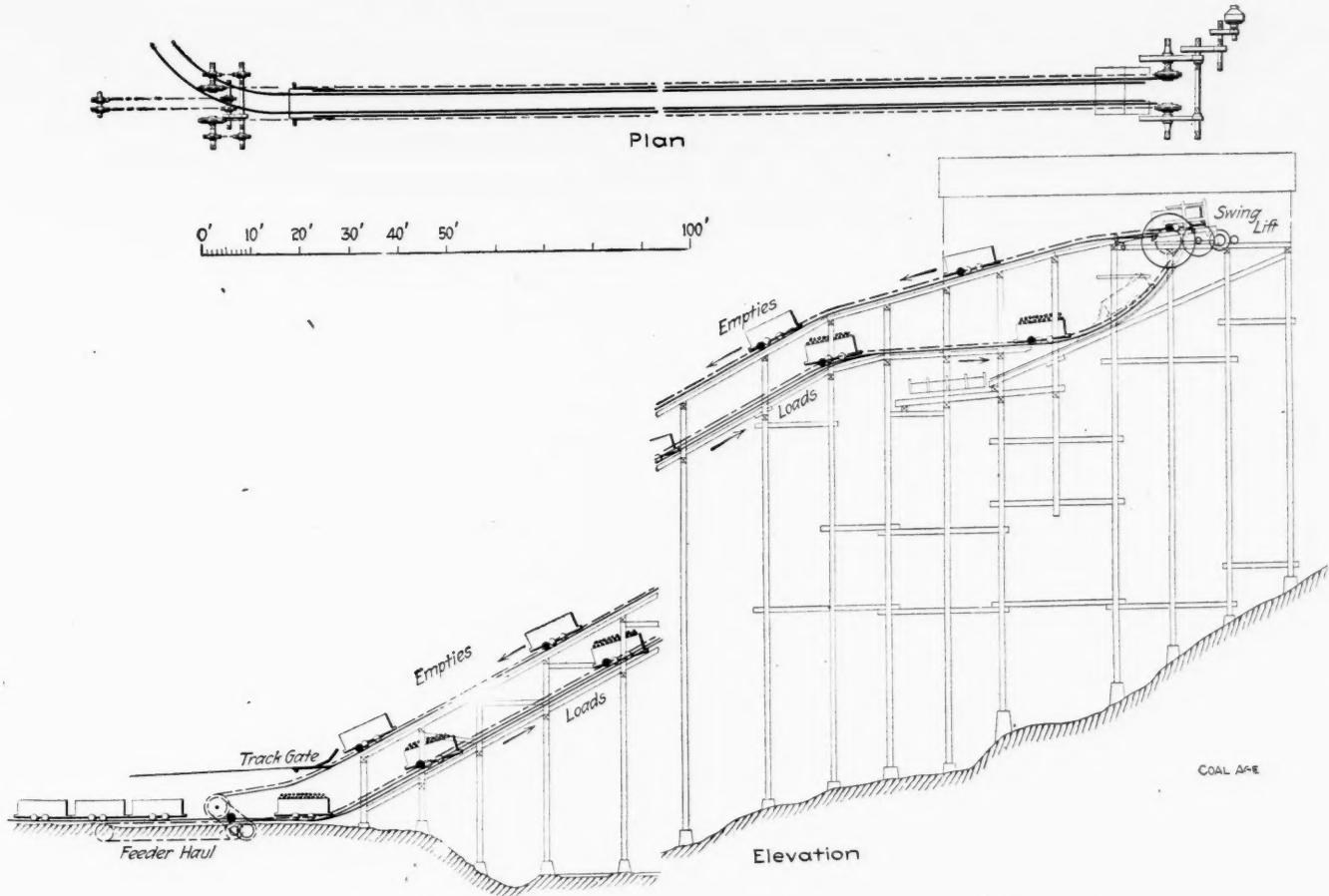
SKETCH SHOWING *Modus Operandi* OF FEEDER HAUL

tardiness if it exists. The superintendent can sit in his office, too, and look up to see that a stop has been made and if prolonged he can hurry to the scene or use his telephone to find the cause and speed its remedy.

Then at night he knows the number and length of stops that were made and the responsible party may be asked to explain these for the dial tells the tale truer than some men on the job care to disclose it. He is also furnished in the same manner the true record of all the cross bars that passed the feeder without cars, as well as the number that took cars, and that tells him more of the story of the day's work.

The Burnside colliery is fed by the openings as named above which have the following capacity per day; Burnside shaft, 400 cars; Burnside drift, 200 cars; Stirling slope, 250 cars; making the total, 850 cars each day. A day at the breaker for handling coal consists of eight and a half hours, not allowing for stops that occur at nearly every breaker each day on account of a slip somewhere or because of a breakdown due to a worn-out part.

Electricity is the motive power employed throughout which adds further efficiency by reason of the time saved in starts and stops.



PLAN AND ELEVATION OF CAR HAUL AND DUMPING ARRANGEMENT

Methane in Coal Dust Explosions

By F. I. Wilbur*

In 1845 Faraday and Lyell in England endeavored to call the attention of the coal mining world to the action and effect of coal dust in aggravating and extending the injurious effects of firedamp explosions. Later, in 1867, M. Verpilleux of France also announced his conclusion that coal dust was an important factor in mine explosions. Since then many workers have investigated the subject and its importance as a factor in aggravating mine explosions is generally conceded. Of late there has seemed to be a tendency among writers on mine explosions to overestimate its importance and to assign it a place as a primary cause of mine explosions instead of giving it its proper place as a secondary or contributing factor.

The British Royal Commission appointed to investigate the causes of accidents in mines reported with regard to coal dust (See II Report of the Royal Commission, 1894, p. 24) that:—

1—Coal dust from many seams is as sensitive to explosion as gunpowder itself.

2—Coal dust is sensitive to explosion in proportion to its freedom from impurities.

3—A supply of oxygen, such as is furnished by brisk ventilation makes a coal dust explosion more probable and severe.

4—A gas explosion in a fiery mine may be carried on indefinitely by coal dust raised by the explosion itself.

FACTORS IN THE SUSCEPTIBILITY OF COAL DUST

Most investigators consider that the explosibility of coal dust depends on:—

1—Its fineness. It is the very fine particles of dust which readily ignite.

2—Its dryness. Damp or wet roads are seldom involved in an explosion, which the dust on dry roads propagates.

3—Its purity. If the coal dust be largely mixed with an incombustible material such as stone dust, it becomes so diluted and its particles become so separated one from another that they can not propagate the flame and carry on the explosion.

4—The thorough mixing with air. Coal dust explosions cannot take place unless the cloud of dust is blown up or stirred up with the air and thoroughly mixed with it. The same is true of gas explosions which are impossible unless the combustible gas be intimately and thoroughly mixed with air. It has been noted as a curious fact in many recent so-called coal dust explosions that the face of the coal has not been affected, the force of the explosions being almost entirely con-

A concise restatement of ascertained facts relative to the action of methane in promoting coal dust explosions, drawn from publications on the subject, domestic and foreign. The opinion of Mr. Wilbur is that coal dust is merely a contributory factor in mine explosions, contrary to recent reliable investigation.

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fined to the main intake airways. (See Engineering and Mining Journal, Vol. 89, p. 1030). A further curious fact is that an excess of dust will prevent or extinguish an explosion.

L. T. O'Shea says (See "Elementary Chemistry for Coal Mining students," 1911, p. 272) that the great difficulty in the case of colliery explosions is to prove, without any possibility of contradiction, the absence of any trace of firedamp at the moment of ignition. Nevertheless he cites several instances where coal dust seems to have been the chief factor in a mine explosion.

THE ABSENCE OF GAS IN EXPLOSIONS

It seems, however, impossible to eliminate the possibility of the presence of more or less methane in all of the so-called dust explosions. The Report of the British Commission on Accidents in Mines, 1886, (See p. 113) after giving some interesting facts about the effects of blown-out powder shots in the presence of coal dust, state that wherever a coal is worked which contains inflammable gas, the atmosphere in the vicinity of the workings, however efficient the ventilating arrangements, will at one time or another, and it may even be said generally, contain some small proportion of fire damp. If the atmosphere contains less than from 2 to 2.5 per cent. of its volume of marsh gas it cannot be detected by the elongation of a lamp flame or the appearance of a cap upon it.

Rollin T. Chamberlin found (See "Notes on Explosive Mine Gases and Dusts" Bull. 383, U. S. Geol. Survey) that analysis of gas obtained from crushing samples of coal showed that it consisted equally of methane and nitrogen each yielding nearly 40% of the total. This fact explains why the sensitiveness of marsh gas to explosion is increased by the presence of coal dust in the atmosphere, and also why air which seems free from gas when tested by a lamp flame may become explosive when laden with fine dry coal dust.

Galloway found that the presence of

coal dust made even 0.892 per cent. of gas in the air explosive. Similarly Abel found that when marsh gas to the amount of only 2 to 2.75 per cent. was present in a coal-dust laden atmosphere travelling at 600 feet per second it would readily explode, and that some dusts were so sensitive that even 1.5 per cent. of methane became explosive in currents of low velocity.

THE CREVICE GAS IN COAL MEASURES.

Methane variously known as carbureted hydrogen, CH_4 , marsh gas, firedamp, "fire" or "gas" exists pent up in the coal itself where it has developed from the progressive formation of the coal beds. In some shallow mines it is rarely if ever detected as it seems able to escape from such mines to the surface through the intervening permeable strata. Other seams give it off in large quantities, especially if they have been long worked and have thus afforded an outlet to drain off the gas from the other seams. It is generally most abundant in seams of much depth where it is given off from the strata and also from the face of the coal and cracks in the floor and roof. If the gas be given off in very large amounts from these cracks it may cause a heaving up of the floor or a falling of the roof.

Sometimes the pressure of the enclosed gas is as low as 30 lb. per square inch, but in many cases the measured pressure of the pent-up gas has been found to be from 460 to 900 lb. per square inch. Under such enormous pressure there is always a liability to sudden outbursts of the gas, which even in the absence of flame sufficient to cause an explosion, are very dangerous as they make the air currents foul and dislodge material. Where the pressure is great the issue of gas from the coal is accompanied with a hissing noise like escaping steam. Such outlets of the gas are called "blowers."

When a coal seam is approached in sinking shafts sudden outbursts of firedamp may occur, especially after a number of shots have been fired and have thus opened crevices for the escape of the gas. In all such cases the atmosphere should be tested with a safety lamp before proceeding with the work.

EXPLOSIVE MIXTURES OF METHANE

The proportions in which mixtures of marsh gas or methane without coal dust explode on ignition appear to range between 7.14% and 16.67% of methane. Beyond these limits the mixture of pure methane and air is inflammable but not explosive. Less than 5% of methane is not even inflammable though under certain conditions the Royal British Com-

mission on mine accidents found that even 4% was dangerous. With from 5% to 5.5% of methane, or one part of methane to 19.17 parts of air they found that an atmosphere became explosive. Coquillon found that in his investigations one part of methane to 16 of air or 5.9% of methane became explosive and Wullner and Lohmann in their experiments in connection with the Prussian Firedamp Commission between 1881 and 1887 reached the same conclusion.

From these proportions the violence of a methane explosion continues to increase in direct ration to its proportion of methane until it reaches 10.3% of methane or one part of methane to 8.3 parts of air. Mallard and Le Chatelier found that this proportion gave the maximum of explosive violence. From this point each increase in the amount of methane correspondingly diminished the violence of the explosion and when the methane proportion reached 16% its mixture with the air ceased to be explosive.

Red hot wires can ignite mixtures of methane and air, those having 6.6% of methane being most easily ignited, but all mixtures having 5.9% of methane can be fired. Methane itself although inflammable is a non-supporter of combustion.

PHENOMENA OF DIFFUSION

Methane is only half as heavy as air and therefore has a tendency to seek the highest point and, if sufficient ventilation shafts were provided, a mine would doubtless be able to keep itself free from dangerous proportions of methane by natural ventilation. It always has a tendency to accumulate wherever there are crevices in the coal, especially in the holes and fissures in the highest point it can reach, such as the mine roof. If these crevices are suddenly opened by the miner's pick or any other cause the gas rushes out and seeks again to rise. If it cannot escape it necessarily becomes mixed with the atmospheric air, especially where there is a brisk ventilating current which increases its attenuation and intimate mixture to a dangerous degree. After being mixed with from 6 to 12 times its volume of atmospheric air it is in a highly explosive condition and if by chance it then comes in contact with a miner's naked light or anything that will ignite it, a fearful explosion almost like that of gunpowder follows.

After the explosion it is found that the methane has combined with the oxygen contained in the air of the mine in such a way as to resolve the CH_4 and air into (1) carbonic dioxide (CO_2), popularly known as blackdamp in the mines, (2) H_2O in the form of water or steam, and (3) free nitrogen. Unlike methane the

CO_2 does not rise but settles in the lowest parts of the mine.

It is rare that methane is found pure in mines as it is usually mixed with other gases chiefly carbon dioxide and sulphuretted hydrogen which tend to reduce the force with which it tends to explode. It is found that when an explosive mixture of methane is diluted with one-seventh of its volume of carbon dioxide, it ceases to be explosive.

Some interesting facts with regard to methane are given by Robert Wabner, (See "Ventilation in Mines", p. 22). He says that once mixed with air, methane (CH_4) will not separate again. When an explosion of this gas occurs two shocks—the shock and counter shock are produced in quick succession. The ignition temperature of CH_4 is 650°C according to Demanet (see his "Traité d'Exploitation des Mines de Houille," 2d Ed. Vol. II, p. 61), or 780°C . according to Kohler.

IGNITION OF METHANE

CH_4 is said to have been ignited by the friction of a drill working in hard sandstone. In a petroleum shaft of Galicia where a miner worked without light because of the shallow depth of the pit, an explosion is said to have been caused by the stroke of the pick.

According to Dr. Brookman of Bochum, the product of the imperfect combustion of methane is ethylene or olefiant gas (C_2H_4) and not carbon monoxide (CO), hence Wabner thinks, coal dust must be the sole cause of the formation of CO and of the poisonous and dangerous character of the afterdamp.

The stronger the ventilating current the greater will be the quantity of dust that it carries with it and the farther will it be transported from the center of production by the ventilating current as it traverses the mine. This fact should be considered in the adoption of any artificial ventilating systems. Strong currents also increase the dryness of the transported dust, and consequently increase the liability to explosion.

Wabner says that certain sintering (clod) coals and non-caking coals in many districts especially when present in thick seams have long been known to possess the dangerous property of occluding and condensing oxygen. This gradually enters into combination with the carbon to form carbon dioxide, the heat thus generated producing spontaneous ignition and disastrous pit fires. The dusty state of coal favors the absorption of oxygen and spontaneous heating.

PRESSURE OF COAL GAS

Towards the interior of coal the pressure of methane materially increases and often reaches a considerable amount,

Behrends found a pressure of 14.6 atmospheres at the bottom of a borehole, 4 metres in depth, in the newly-opened section of the No. 13 seam at the Hibernia Colliery in Gelsenkirchen, Westphalia. In some very deep Belgian pits, pressures of 20 to 23 atmospheres have been recorded and as high as 42.5 atmospheres in a borehole in unworked coal.

Wabner says that the rule seems to be that the greater the depth of a seam below the surface, and the more effectively it is shut off by impenetrable cover rock, the higher will be the pressure of the imprisoned gas, and consequently the more violent the outrush of gas when the seam is tapped, but the longer it is worked and the greater the number of galleries and other openings made therein, the more will the initial pressure and outflow diminish in the course of time until finally the latter ceases altogether or diminishes to an imperceptible quantity.

It follows naturally, therefore, that more gas is thus encountered in opening out a new section of a coal mine than when the same has been worked and has long been traversed by headings. Wabner thinks that there is thus evidently an analogy between the occurrence of fire damp and pit water, for in both cases the initial outflow is the greatest, diminishing in a short time as the drying progresses.

It should be remembered that when CH_4 combines with oxygen it is decomposed into CO_2 (carbon dioxide) and H_2O (water). Thus the progressive absorption of the oxygen by this CH_4 either within or outside of the coal structure would tend to a progressive increase in the amount of water formed.

GAS AS A COMMUNICATOR OF COAL

According to Wabner (p. 27) the volume of gas can be reduced (1) by the ventilating current, (2) by limiting the output of coal, and (3) more especially by regulating the preliminary work of opening up new sections of the pit. In connection with the last precaution he mentions the following facts:—

"Since under ordinary conditions the gas intimately permeates the coal and fills its pores at a higher or lower pressure, the gas also influences the coherence and firmness of the seam, and under certain circumstances may make the coal friable and brittle. For this reason fiery bituminous coal beds frequently yield nothing but small coal; and occasionally this factor becomes so prominent as to make coal-getting dangerous, especially in sloping seams. This evil can be counteracted by tapping the bed with bore-holes before commencing to win coal from the face: in this way the coal is rendered more solid and resistant. More especially has this contingency to be taken into consideration when two

gassy seams are united in close juxtaposition. In such event the coal could undoubtedly be more easily won by working both seams simultaneously, and only small coal would be obtained; whereas by working one seam before the other, an opportunity is afforded for the gas in the second one to escape, and the coal from this will then be more solid and furnish a larger proportion of lumps."

In the Report of the British Royal Commission in 1886 on Accidents in Mines, it is said (p. 112) that "The experiments we have made on the pressure of firedamp in plugged bore holes, in coal, a pressure amounting to upwards of 400 pounds on the square inch, have thrown much light upon the occurrence of sudden outbursts of gas. The boring of holes upward or downward has been successfully tried as a means of avoiding such outbursts.

"It is almost impossible to account for many of the accidents which have occurred in well-managed mines, some of which have originated in the main-intake airways, except upon the supposition that gas has suddenly invaded the workings from the adjacent strata. Sudden outbursts of large quantities of gas, accompanied by violent disruption of the floor, roof or coal, are fortunately rare, but smaller incursions of gas, accompanied by falls of roof, or even without any apparent displacement of strata, are comparatively frequent."

The Commission believed that these abnormal discharges of gas might be successfully met by ample ventilation,

good discipline and efficient lamps. While they recognized that variations of atmospheric pressure exert an influence for the escape of gases which have accumulated in cavities, and possibly to a slight extent on that of gases emitted directly from the coal, they questioned the wisdom of placing entire reliance on meteorological warnings such as the fall of the barometer. In their opinion, safety must also be ensured by unceasing vigilance on the part of the officials and workmen in the mine, irrespective of such warnings.

EMISSION OF METHANE

The experiments of Rollin T. Chamberlin and others* have shown amongst other facts that methane is given off by all coal and is quantitatively by far the most important gas which it evolves usually amounting to from 80 to 95 per cent. of all the gas which is emitted but in some cases it reached 98 per cent. It is significant that it was found that anthracite coal yielded the highest per cent. of methane in the gas liberated, but that low atmospheric pressure which aided the escape of gas from bituminous coal had less effect on the liberation of gas from anthracite.

Other facts established by experiments are that finely powdered fresh coal gives off more methane in a vacuum than the same amount of lump coal subjected to the same conditions and that the finer the

coal the more rapidly and completely was the gas liberated in a given time.

These facts seem to indicate clearly that the increased facilities for the elimination of methane that are acquired by coal with each increase in the fineness of pulverization, must also increase the liability to and destructiveness of a mine explosion after ignition and in direct proportion to the degree of the comminution of the combustible coal. That methane and other gases are constantly exhaled by the coal is shown by the fact established by experiment that fresh dust yields five times as much combustible gas as old dust and only one-third as much non-combustible gas. Age apparently tends to lessen the explosive tendencies of coal dust. In its last analysis, therefore, coal dust must be regarded as a secondary predisposing cause to mine explosions, the primary predisposing cause being the methane the undue accumulation of which is favored by the dusty form of coal. Proper ventilation to give a constant outlet to this gas, and the application of lime or rock dust to offset the uplifting and gas-extracting effects of low pressure on the comminuted coal would seem to be the easiest and least dangerous methods of dealing with the dust problem. The material thus treated might be later collected and converted into some kind of building material. It would seem better still if after condensation the dust could be conveyed to some reservoir where pressure or chemicals could be applied to condense the dust into combustible briquets of coal.

*See notes on "Explosive Mine Gases and Dusts," Bul. 383, U. S. Geol. Survey.

Coal Mine Ventilating Equipment

By W. M. Weigel *

The distinguishing features of several forms of modern steel-plate fans are discussed, as are also two types of high-speed fans, a comparatively recent development in the line of mine ventilating equipment. This is the fifth article of a series dealing with mechanical ventilators.

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prevent heating or wear from any deflection of the shaft. This, as well as other types of fans, often have the bearings water jacketed on the lower side to prevent undue heating.

The diameter of the inlet is about $\frac{2}{3}$ the diameter of the fan wheel. Distinguishing features of this form of fan are: the large clearance between the fan and casing, especially at the cutoff, and the slight rate of increase in the

radius of the spiral until the discharge opening is reached. The fan shown in Fig. 6 has an inlet on one side only, but these fans are built with two inlets if necessary.

JEFFREY FAN

Like other modern mine fans, the Jeffrey type is constructed entirely of steel plate except for that portion of the housing included within the foundation. These fans are built with either a single or double inlet. As illustrated in Fig. 4, the double-inlet form has a central disk of the same diameter as the wheel. The outer sides of the blades are fastened to annular side plates or cheeks, the inner diameters of which are the same as the diameter of the inlet openings in the casing. These annular plates are braced and held rigid by round iron rods which spring from a small hub on the shaft and offer practically no obstruction to the inflow of air. In the single-inlet type of fan, the solid driving disk forms the side plate of the wheel on the side opposite to the inlet.

TABLE 1. TEST OF 14 FT. by 4 FT. 6 IN. JEFFREY FAN,
FOR NEW PITTSBURG COAL CO.
INDICATED HORSEPOWER OF ENGINE.

Rev. per Min.	Travel of Piston in Ft. per Min.	Mean Eff. Pressure	Area of Cylinder	Indicated H.P.
75	225	7.05	283	13.6
100	300	12.85	283	33.2
125	375	19.35	283	62.4
150	450	30.45	283	117.8

QUANTITY OF AIR DELIVERED

Rev. per Min.	Average Velocity of Air	Net Area of Drift	Cu.Ft. Air Delivered per Min.	Volume of Fan, Cu.Ft.	Volumetric Capacity of Fan
75	1600	50 sq.ft.	80,000	692	154%
100	2100	50 sq.ft.	105,000	692	151%
125	2500	50 sq.ft.	125,000	692	145%
150	3200	50 sq.ft.	160,000	692	154%

WATER GAGE AND MANOMETRIC EFFICIENCY

Rev. per Min.	Water Gage in Inches	Peripheral Speed of Fan	Theoretical Water Gage	Manometric Efficiency
75	0.9	3300	1.4	64%
100	1.6	4400	2.4	66%
125	2.4	5500	4.0	60%
150	3.4	6600	5.7	60%

HORSEPOWER IN AIR AND MECHANICAL EFFICIENCY

Rev. per Min. of Fan	Water Gage	Cu.Ft. Air per Min.	Hp. in Air Delivered	Indicated Horsepower	Mechanical Efficiency
75	0.9	80,000	11.36	13.6	83.5%
100	1.6	105,000	26.5	33.2	80.0%
125	2.4	125,000	47.35	62.4	75.8%
150	3.4	160,000	85.95	117.8	73.0%

The distinctive feature of these fans is the number and shape of the blades. Referring to Fig. 5, it is seen that there are eight main wings or blades extending from the periphery of the wheel into the inlet space for about $\frac{1}{3}$ of the distance from the circumference of the inlet to the center. Starting at the inner end, these blades slope backward from the direction of rotation to a point just within the circumference of the inlet and then curve forward in a circular arc to the periphery; so that at the tips, their course is forward from a radial line, in the direction of rotation.

Half way between the main wings, is another set of a length equal to that of the curved portion of the main blades and curved to the same radius. Between these and the main blades is still another set with a length about one-half that of the second set and curved to a shorter radius. In the angle between the inner ends of the main blades and the circumference of the inlet are located conical sheet-steel scoops projecting into the inlet beyond the side line of the fan wheel. It is claimed that these strengthen the action of the fan and prevent gushing of air back into the inlet.

The diameter of the inlet is about $\frac{1}{7}$ of the diameter of the wheel. The clear-

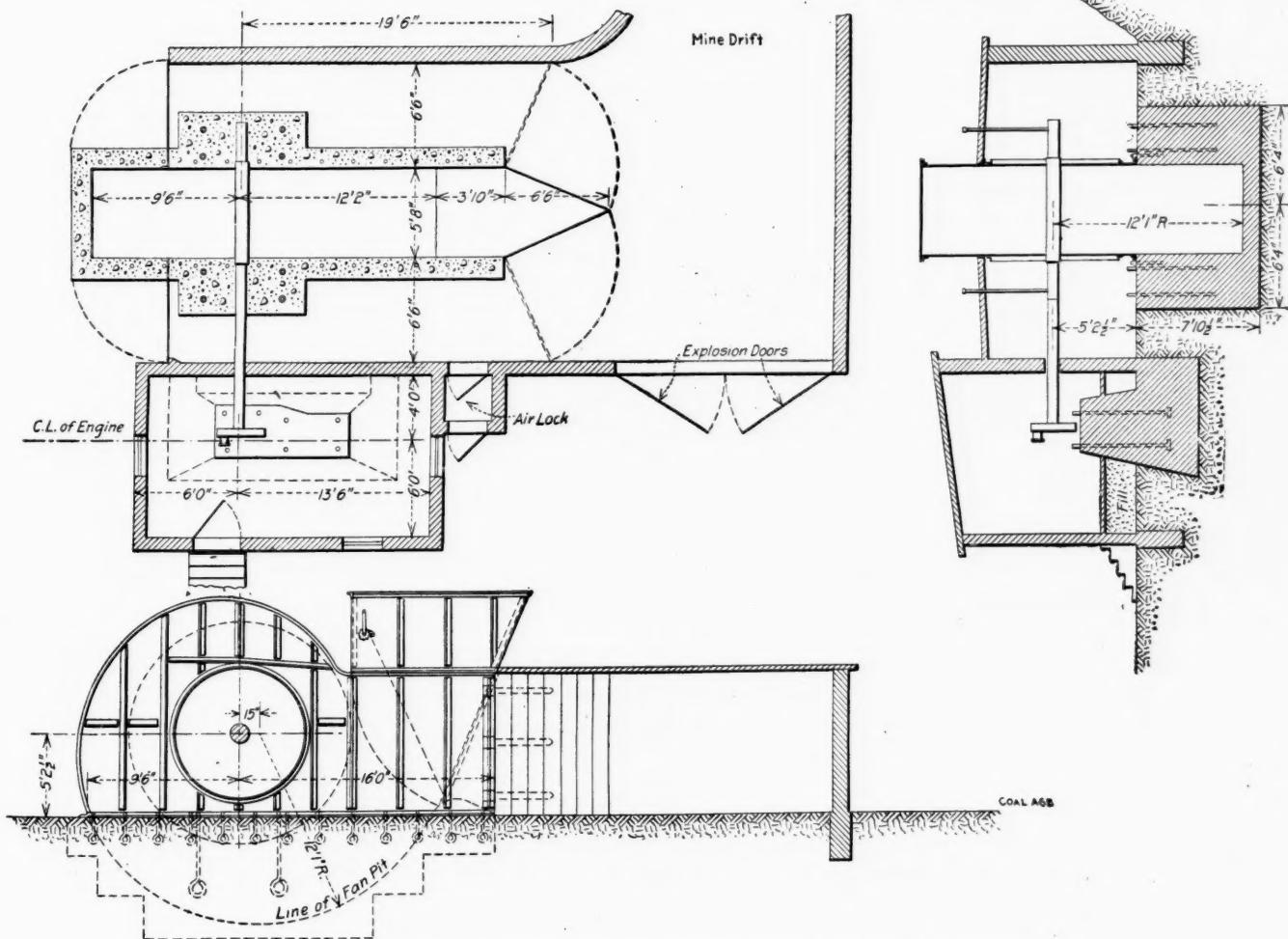


FIG. 1. PLAN AND ELEVATIONS OF JEFFREY DOUBLE-INLET TYPE "D" FAN

ance at the cutoff is small and the spiral casing has a rapidly increasing radius. Disregarding the long main blades and scoops, this form of fan closely resembles the multivane fans in the number and forward curvature of its blades.

Fig. 1 shows the setting for a double-inlet Jeffrey fan, arranged primarily for exhausting but so designed that it may be converted into a blower.

In Table 1 are given the results of a test, of a 14-ft. diameter by 4 ft. 6 in. wide, single-inlet fan, installed for the New Pittsburg Coal Co., at Murray City, Ohio.

HIGH-SPEED FANS

The term "high-speed fan" refers to fans operating at relatively high rotative speed rather than at high peripheral speed, and is used to distinguish a class of fans which has been developed within

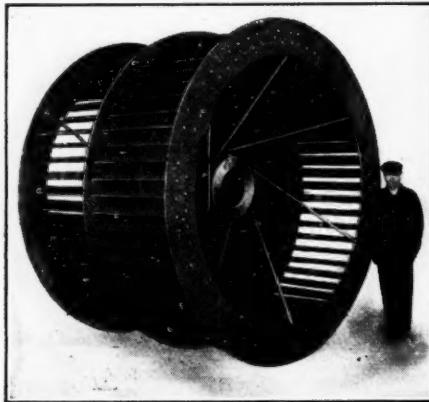


FIG. 2. "SIROCCO" FAN WHEEL

the past few years and only recently has been applied to mine ventilation to any extent. High-speed fans have many excellent features to recommend them and a number of successful installations have been made in various sections of the country, although some mining engineers still hold them in disfavor.

These fans are distinguished by the large diameter of the inlet as compared with the diameter of wheel, the radial length of the vanes or blades being only from $\frac{1}{8}$ to $\frac{1}{16}$ of the wheel diameter. A great number of vanes are employed, usually from 42 to 64. The fans are further distinguished by having their blades curved concavely toward the direction of rotation. The casing expands rapidly and gives a large discharge area at the point of cutoff.

The main points of advantage of this type of fan are low first cost of fan and installation, small space requirement, good mechanical efficiency and volumetric capacity, suitability to developing high-water gages, and, on account of the high rotative speeds, facility of direct connection to electric motors.

SIROCCO FAN

One of the first high-speed types to be developed was the Sirocco fan. Fig.

2 shows the general construction of the wheel or runner of a double-inlet fan of this variety. A single-inlet type is also made. The central or driving disk is of heavy steel plate, springing from a cast hub, which in the double-inlet form is made in halves. The outer surface of this central disk is conoidal in form in order to prevent eddying of the air as it enters the wheel. The 64 blades are of pressed steel and are supported

between the central disk and the front plates, or inlet circles, which are also made of heavy steel plate. The inlet faces of the wheel are stayed by tie-rods from the hub. This arrangement leaves the inlet practically unobstructed. Fig. 3 shows a Sirocco fan in service at Shaft No. 35 of the Berwind-White Coal Mining Co., Windber, Penn., and illustrates the adaptability of this type of fan to direct electric drive. This installation

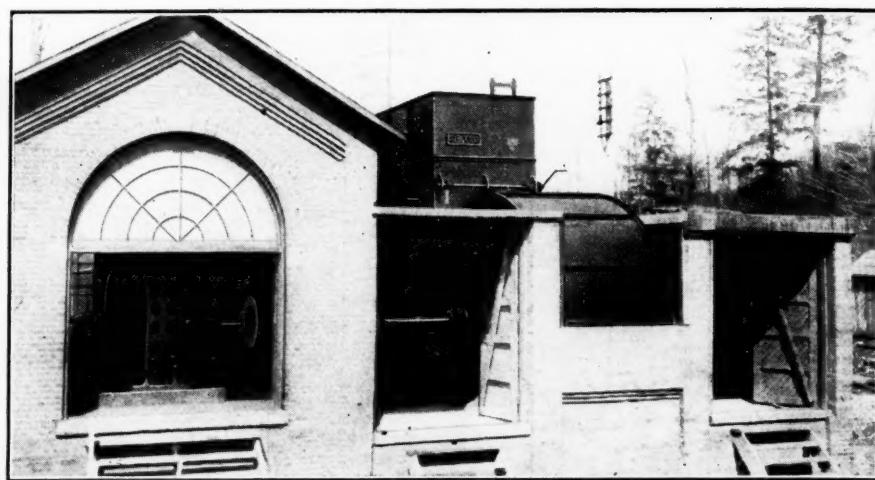


FIG. 3. "SIROCCO" FAN AT SHAFT 35, BERWIND-WHITE MINING COMPANY, WINDBER, PENN.

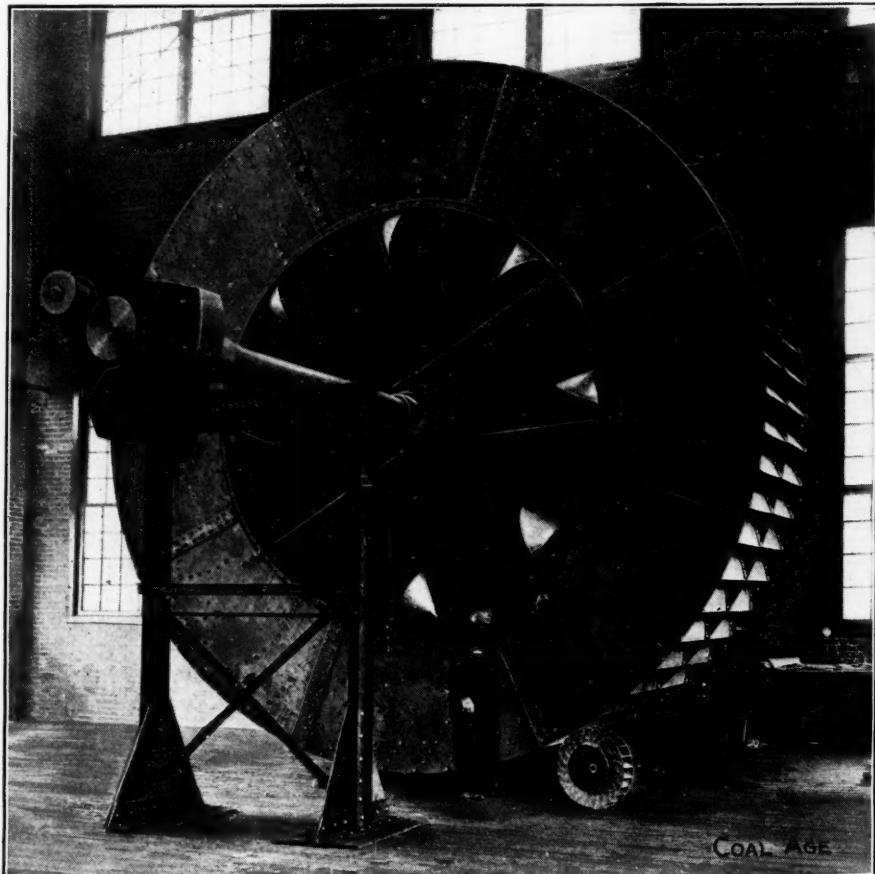


FIG. 4. JEFFREY DOUBLE-INLET FAN WHEEL

delivered 315,000 cu.ft. of air per minute at 5.6 in. water gage while running at 252 r.p.m. The wheel is 108 in. diameter by 72 in. wide. The small size of the fan house is at once noticeable.

THE STURTEVANT MULTI-VANE FAN
The Sturtevant multi-vane fan is quite similar to the Sirocco fan in construction and general details, the main difference being that the vanes, in addition to being

curved concavely in the direction of rotation, are also corrugated or spooned across the face in a radial direction. This form of vane is claimed by the manufacturers to prevent the air from slipping along the blades in a direction parallel to the axis of the wheel and thus increases the volumetric efficiency of the fan.

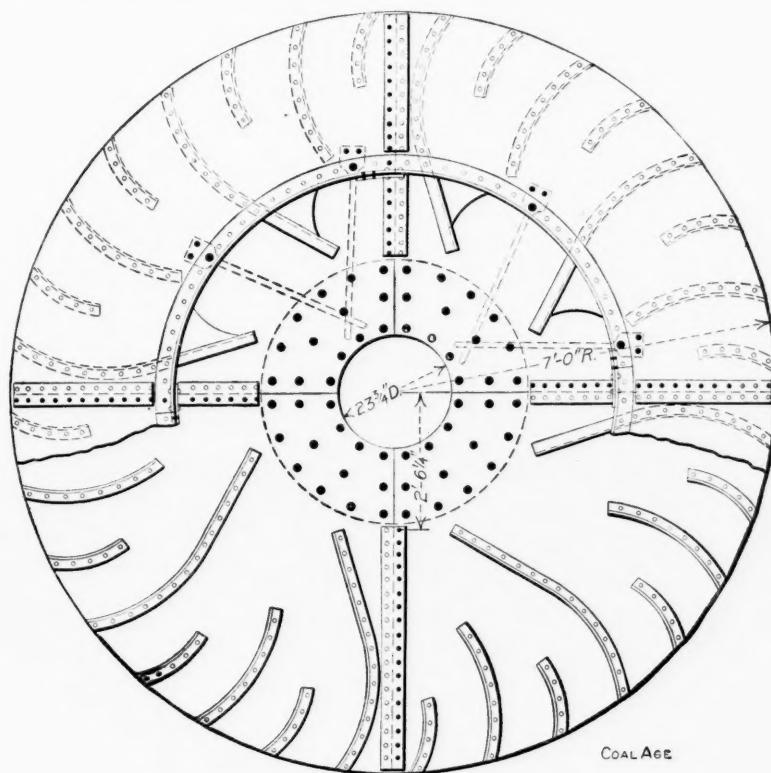


FIG. 5. DETAILS OF JEFFRY 14-FT. FAN WHEEL

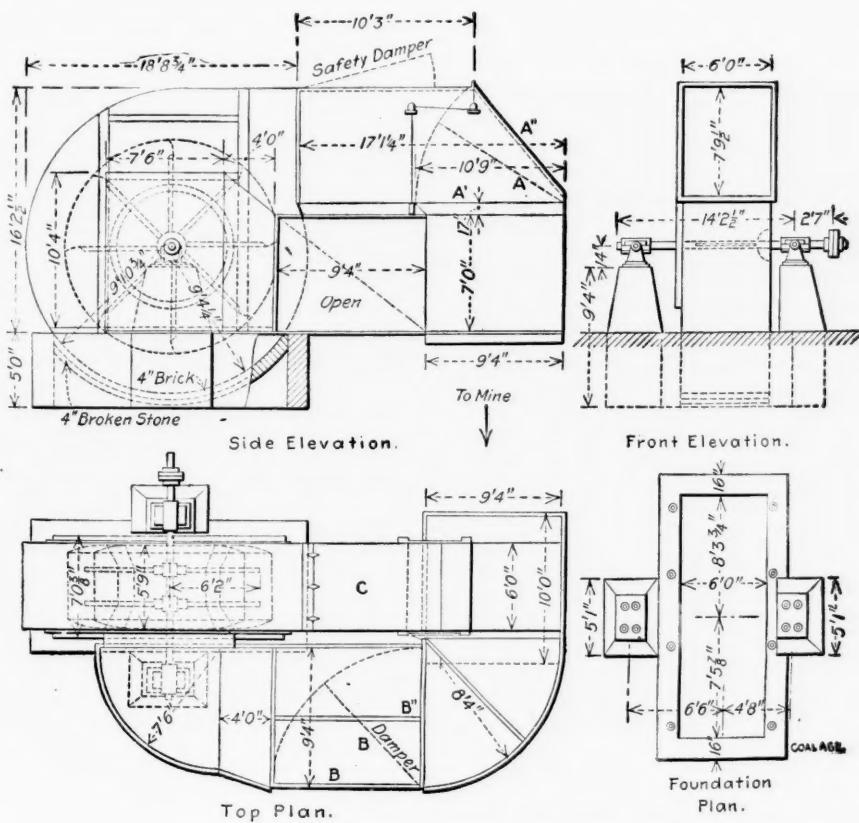


FIG. 6. BUFFALO FORGE CO. FAN FOR MODOC COAL CO.

Cost of Anthracite Coal

Anthracite coal was at one time an important factor in blast-furnace practice, but for this purpose it has been almost entirely supplanted by coke made from bituminous coal, according to E. W. Parker, coal statistician of the U. S. Geological Survey, in an advance chapter from "Mineral Resources for 1910," lately issued. The principal future demand for anthracite will be restricted largely to domestic trade, for which the sizes known as furnace, egg, stove, chestnut and pea are required.

The breaking down of the lump coal, which was formerly a marketable product, for the preparation of the domestic sizes, results in an increased proportion of the small or undesirable sizes, all of which are sold at less than the cost of production. The proportion of these small sizes has increased from 23.1 per cent. in 1890 to 41.6 per cent. in 1910, while the proportion of sizes larger than pea coal, or what may be termed the profitable sizes, has decreased from 77 to 58.4 per cent.

The price of anthracite coal at the mines in 1910 averaged \$2.13 per long ton. All the profits on the mining operations must be obtained from the prepared domestic sizes, for the revenue obtained from the smaller sizes, which are sold largely in competition with bituminous coal for steaming purposes, serves only to reduce the cost of the domestic sizes. The conditions under which the anthracite mines are operated, says Mr. Parker, the greater depths to which the workings are carried, the consequent increased expense of mining, and the increasing cost of labor all contribute to make anthracite fuel more and more a luxury. No hope is held out to the consumer that anthracite will, in the future, be sold at lower prices than those which prevail today; on the other hand, there is every reason to believe that prices must advance in accordance with the increasing cost of production. It is only by reason of economical administration that prices are not higher than they are.

During recent years the anthracite operators have adopted the policy of making an allowance of 50c. per ton from circular prices for domestic coal purchased in April of each year, with an advance of 10c. for each succeeding month until the schedule prices are restored in September. This has had a salutary effect in steadyng the trade and permits the mines to be operated more regularly.

Current Coal Literature

The Best Thought Culled from Contemporary Technical Journals, Domestic and Foreign

Gob Fires in Yorkshire, England

The following is an abstract of a statement made by W. H. Pickering, one of the English mining inspectors, in the course of an inquiry of the British Home Office into the gas explosion at the Jam-mage Pit, North Staffordshire. Mr. Pickering was asked to present an account of mine fires in the neighboring South Yorkshire coal field.

It appears that the more fiery coal seams in Yorkshire, that is, those which give out the greater amount of gas, are not those which are most actively troubled with mine fires. However, the Barnsley seam, in the Doncaster neighborhood, is an exception to that general rule. The coal lies deep, the deepest shaft reaching the bed at a depth of 2715 ft. A typical section shows a seam 9 ft. 2 in. thick, including a parting of dirt 6 in. thick. In this one seam are contained five distinct beds; one of these is a hard coal suitable for steam, 2 ft. 2 in. thick, and the rest is soft house coal. The seam is very gaseous; outbursts of firedamp are common, and the gas can always be found. A recent analysis showed nearly 2½ per cent., in air currents of 88,000 cu.ft. per minute.

The men have to be withdrawn from time to time, owing to the presence of gas in dangerous quantities. An inferior fireclay underlies the seam, and the roof is, as a rule, a tender shale. The seam is worked on the advancing long-wall system, the gate roads of which are from 40 to 50 yd. apart. For commercial reasons, a large percentage of the coal is not sent out of the pit; the harder coal, being very valuable, is carefully extracted, and the bottom, or soft coal, is systematically worked with it. Most of the top soft coal is lost. In some cases no attempt is made to work it, the only part recovered being any large lumps produced when the gate roads are ripped. At these pits, the slack made in the face is also thrown into the waste, and the total loss in some of the new mines is over 40 per cent. of the seam. The roadways are troublesome to keep in order, and large quantities of dirt are moved during each repairing shift. As much as possible is stowed in the gob, but frequently such stowage is impracticable. Every effort is made to withdraw the timber from the gob and from the abandoned roadways.

FIGHTING GOB FIRES

As a rule symptoms of heating are detected in the early stages, but at times the fires reach the burning point before they are suspected. Fires occur in the gob and die out without the management knowing anything about them. Their ashes are sometimes found when roads are being driven through old wastes. It will be readily understood that in the advancing longwall system of working, the difficulty of isolating fires by dams is almost insuperable. The strata are so broken up that gas-tight dams could not be built. The fires are dug out at all cost, even in cases where stoppings might be practicable. The operation of digging out a gob fire consists of driving headings into the fire area and extracting the burning or heated material, and sometimes packing the space with sand. Water jets under great pressure are used to quench the fire or cool the heated strata. It is quite simple on paper, but in practice is very difficult and dangerous. The heat is often so great that the men can only work for a few minutes at a time, and the ventilation must be arranged so no firedamp will pass over the fire. The work is costly.

Nevertheless, digging out is far safer and more economical in the long run than stopping. When a fire area has been dug out and the spaces packed with sand or otherwise effectively treated, it usually gives no more trouble. If a fire is stopped off it may annoy the management for years, and noxious gases from it may find their way into the mine workings.

English Ventilation Laws

In an address on "Duties and Qualifications of the Deputy and Fireman as Defined by the new Regulations," delivered at Ashby-de-la-Zouch on Jan. 6, G. H. Winstanley remarked as follows:

A ventilating current may have a volume of as much as 250,000 cu.ft. per minute. This is quite an ordinary quantity in the Lancashire field. In the course of 24 hours, the total weight of air passed through such a mine would amount to no less than 12,000 tons. Such a volume of air is capable of diluting, within the limits provided for in the Act, a volume of gas which would suffice for the needs of a large town.

The moisture present in the mine air should not be permitted to become excessive. The limit of wet-bulb temperature should certainly not be higher than 75, and 70 would be a better limit to adopt. That circumstance virtually disposes of the watering of deep mines as a safeguard against the dangers of coal

dust. It is important that deputies and firemen should understand those points, because I have found, in more than one instance, that miners regarded high temperature as a definite and unmistakable proof of the presence of gas.

OXYGEN CONTENT NOT TO FALL BELOW 19 PER CENT.

I feel sure that the new standard of 19 per cent. of oxygen as a minimum presence of that constituent in mine air is by no means difficult to attain. In 1907, in connection with the investigations of the Royal Commission, Dr. Cadman and Mr. Whalley made careful inspections of some 40 selected collieries where either abnormal difficulties were met with, or where the ventilation was considered as capable of improvement. In 11 of these cases only was the ventilation found to be below the standard now established, and all of those, I believe, were cases where there should have been no difficulty in securing better ventilation. It is a curious but easily explained circumstance that those collieries which are easiest to ventilate have usually the impurest air.

In many cases there is an impression that ventilation only becomes important where inflammable gas has to be considered; consequently, in mines which are supposed to be free from methane the ventilation is often neglected.

On the other hand, mines in which inflammable gas is given off somewhat freely must be ventilated with such a volume of air as insures the oxygen percentage being kept well above the lower limit now permitted. For example, it is easy to show that to lower the oxygen percentage to 19 by the mere admixture of inflammable gas would require the latter to be in the proportion of nearly 10 per cent. Similarly, except perhaps in very rare cases of mines which give off carbon dioxide, the new standard of 1¼ per cent. of that gas (the maximum now, by law, permissible) cannot be regarded as one difficult of attainment. A lamp, however, affords no reliable guide either to the oxygen or the carbon dioxide standard. If the lamp is extinguished, it is certain the percentage of oxygen, demanded by the regulations, is not present, but we need to be able to determine when the percentages approach the limit set by the legislative provisions.

DETERMINATION OF OXYGEN

For open-light mines the tube and taper apparatus of Dr. Haldane may be used to determine the oxygen and carbon dioxide percentage, but in safety lamp mines it may, as a rule, be assumed that the oxygen and carbon dioxide percentage will be kept within the regulations by proportioning the ventilation properly to dilute the inflammable gas. In mines where safety lamps are used and inflammable gas is given off by the coal, the only method of determining the percentage of oxygen and carbon dioxide is by means of the analysis of samples.

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Of this issue of Coal Age, we will print 7000 copies. No copies will be sent free regularly. There will be no back numbers. The figures shown here each week represent live, net circulation.

This journal has a direct aim—a single purpose—which is to help advance the coal-mining industry. Its creed embodies the dissemination of knowledge and the free interchange of ideas among its readers, all of whom are invited to become regular contributors.

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COAL AGE

The Jammage Mine Fire

It is so customary to regard mine fires as the outcome of burning gas, explosions or of inflamed brattices, whether of cloth or wood, that the history of the Jammage mine fire in England should serve to recall those less general conditions to which the lignite fields of North America are especially subject.

On Nov. 25 of the past year, a fire broke out in the gob of a mine generating gas. The area was worked by longwall, but the extraction of coal was not complete. Because the mine was developed irregularly, due to the contortions of the strata, there were more than two approaches to the district where the fire occurred, and it was necessary to confine the conflagration by the building of several stoppings. Moreover, as the area mined was not in panels surrounded by pillars of coal, the gob to be shut off was large.

It was some time before the fire made itself apparent. A sulphur smell is alleged to have appeared early on Thursday morning. A pillar of the mine was found to be heated on Friday, and at 7 a.m. that day all the men were removed from the mine except those that were to close off the fire.

Unfortunately, the colliery officials decided to build their stoppings once for all of stone and dirt, and made no effort to keep air from the fire by the use of temporary brattices. It must be remembered that they appear to have expected an explosion and desired to assure themselves that when it occurred, only that part of the mine which was not working would be involved. The stoppings for some reason took 27 hours to build, and during that time the coal must have inflamed and the gas exploded. The damage done by the explosion was inconsiderable, nevertheless, six men were killed by the resulting gases.

It was suggested that the fire should have been extinguished by water. Those on the ground were best able to judge, but surely wood brattices could have been more rapidly constructed than brick stop-

pings, such as the experts suggested in the Home Office investigation. This would have shut off the air within an hour of the time when the need for closing up the fire area was recognized.

The objection to a brick stopping is the long time required for the maturing of the cement in the joints. It is slower in erection than wood, and slower to become efficient than a stone filling. Nothing but a rock wall should have been ultimately relied upon, but it does appear that the first protection should have been secured by the use of timber.

Efficiency

There is, in any language, no word that spells SUCCESS as surely and as plainly as *efficiency*. Thrift is a near neighbor to efficiency, the latter is indeed the outgrowth of the former; for what man can become efficient who has not learned the principles of thrift, or who is thrifty without proving his efficiency?

Success is the crowning sheaf—the certain award of efficient toil. That man is efficient as a worker who can produce results; or, in common terms, "deliver the goods." Such men are needed today in coal mining more than in any other trade or calling.

It requires no argument to demonstrate the fact that the industry of coal mining is peculiarly environed. It is subject to limitations so proscribed as to demand the exercise of the strictest economy in operation. A living wage for the miner, a reasonable profit for the operator, and a price to the consumer that will place this great necessity of life within the reach of all.

The problems of coal mining would be less difficult of solution if coal could be classed as a luxury. The demand for wage increase could then be met, if necessity required, by a corresponding increase in the cost to the consumer. The luxuries of life will always bring whatever price their production and a fair business profit demand. Only those whose means will allow them to pay the price

can have the luxury; others must do without.

But we are face to face with the fact that coal is not a *luxury*, to be had if one possesses ample means; it is a necessity of life that *all*, rich and poor alike, require and must have. It is this fact that fixes the upper limit in the coal mining problem. It is a hard, cold fact, as cold as the cheerless fireside without fuel in December.

The high cost of living may create a demand for wage increase. What is the coal operator to do in that event? The margin between the *living wage* and the *living price* is so narrow that the risk does not warrant investment. If there is not soon found some way out, capital will seek other more lucrative fields.

This is only one of the many problems confronting the coal operator. There are others as serious and as threatening, which we have not space to treat as they should be treated, now. What is the remedy? This is the question that operators in all coal fields are asking today.

There is but one answer as far as the mining of coal is concerned. There must be greater efficiency. This does not mean more work or longer hours, for the same pay. That would not spell *efficiency*. It means less waste of time and material in and about the mine; more system in the planning and execution of work; more devotion to the work of mining and less sympathy for the idlers whose only thought and desire is apparently to give less and demand more. No honest worker can uphold such a creed; but all must recognize that the only sound doctrine is "*a day's work for a day's pay*." Let this be written on the heart of every mining man, whether he be mine official or miner; and let each strive to prove himself more efficient in the work he has to do.

Methane in Coal Dust Explosions

Under the above caption in the present number of COAL AGE, Mr. Wilbur summarizes the results of his inquiries and researches into the origin of mine explosions. The publishing of this paper should not be construed as an endorsement of all Mr. Wilbur's conclusions. For any such detailed approval, he must look to others, to the hundreds who in face of all proof to the contrary still

contend that coal dust will not explode unless ignited by methane. Such statements are never backed by any careful reasoning. The usual method is to face the issue by a personal asseveration, by the *ipse dixit* or "take it from me" of the asseverator. Signs of such a standpoint are found in Mr. Wilbur's argument, but in his paper he makes a plea for the reasonableness of his view, so that we feel he would not compel us to accept it on the mere force of his authority.

But for what imaginable purpose have the experiments at Pittsburgh, Bruceton, Altofts, Liévin, Frameries, Gelsenkirchen and Babitz been conducted at so much unnecessary trouble and expense if we, following Mr. Wilbur, are complacently to avoid quoting the results there obtained and are to draw on the unexperimental dicta and baseless imaginings of a decade or two ago?

He quotes the well-known Chamberlin monograph, as far as quotation will serve his purpose, carefully showing how much free methane can be liberated by crushing and carefully abstaining from showing how slowly, we had almost said laboriously the coal liberates methane thereafter. Even so far as Mr. Chamberlin is quoted, with all the handicaps of an *ex parte* quotation, we cannot see that the Bureau of Mines and its explosions' expert, Mr. Rice, are hoisted on their own petard. If Mr. Wilbur had quoted the further remarks of Mr. Chamberlin, he would have arrived at the conclusion that coal after crushing ceased to deliver gas with the rapidity with which it is liberated when crushed.

There is no reason to suppose that every particle of coal dust is surrounded by a methanized gaseous pellicle, or that the mine in general is made explosive by the emission of methane from the floating or the resting dust. In the first six weeks coal crushed in air and immediately placed in a vacuum only developed 0.0538 per cent. of its whole volume of methane per hour. In the following ten weeks the percentage fell to 0.0101 per cent. and in the ten weeks succeeding, it still further fell to 0.0035 per cent. As the air in the mine is changed about every half hour, these figures might well be divided by two.

Even if the mine were packed full of dust, the hourly percentage of gas it would generate would nevertheless be in-

appreciable. We must remember that Chamberlin was dealing with a coal of high methane content for the dust just described came from Monongah. Dust from non-gaseous mines, as we term them, would have lower values of methane emission, especially when newly pulverized.

But this method of arguing may be fortified by still another. The Bureau of Mines, in its Pittsburgh gallery, has obtained ignition and propagation when using only two pounds of dust and no gas. This gave a dust density of 25.3 grams per cu.m. According to Mr. Chamberlin's figures, the coal, before crushing, would have held 2.67 cu.cm. of free gas, of which 39.65 per cent. by weight would have been methane. Careful estimation shows that had the coal been broken into bottles in *vacuo* and these bottles sealed and conveyed to the confined gallery, they would have added to the air in that gallery on release only 0.0000808 per cent. of methane. Judge therefore how little methane must have entered the gallery when two pounds of dust comminuted in air, were blown into it to circulate at a pressure not less than atmospheric.

In conclusion it may be added that modern research has proved that the explosion of methane in an atmosphere insufficient for complete combustion results in the generation of carbon monoxide, thus contradicting the results of Dr. Brookman of Bochum whom Mr. Wilbur quotes in his article with apparent approval.

The question has been raised whether pure coal dust on a safety lamp can be exploded from the lamp. Few persons have met with this experience in practice, and it is probable that the question has been given thought by only a small number of coal men; however, under certain conditions, it is possible to get such an explosion experimentally. A mining man in South Wales relates an instance of a safety lamp that had been continuously in use underground for some hours and on the gauze of which coal dust had collected; he experienced a slight explosion in the lamp, followed by a second and much more violent explosion immediately afterward. The second explosion was believed to be due to the shock of the first explosion precipitating more coal dust into the flame.

Discussion by Readers

Comment, Criticism and Debate upon Previous Articles, and Letters from Practical Men

Sealing off a Mine Fire

(Continued from Feb. 10)

Letter No. 24—I think that when a fire occurs at the end of an entry, the first thing to do is to diminish the circulation of the air past the fire. Under ordinary conditions, it would seem easier to build a wall on the intake side first; then, by reversing the circulation, the smoke could be forced back so that the fire would be confined to the smallest possible area. This would reduce the supply of air, walled in with the fire, to a minimum. To accomplish this, it is best to set the first stopping of brattice cloth or lumber far enough ahead of the last open crosscut to permit of the building of a permanent wall between the crosscut and the temporary brattice.

four legs, two of which are hinged to the central plate just mentioned, and two to a corresponding plate at the rear. The front and back walls of the mattresses are prevented from bulging outward under the air pressure by the use of ribbon stays. When the bag is properly inflated, it fits and adheres to all the various irregularities of the outline of the heading, and is prevented from forming itself into the shape of a balloon by the restraining force of the stays, just mentioned.

CARL SCHOLZ,
Vice-Pres. and Gen'l. Mgr., Consolidated Indiana Coal Co.

Chicago, Ill.

Letter No. 25—There are mine fires and mine fires; there are men of exper-

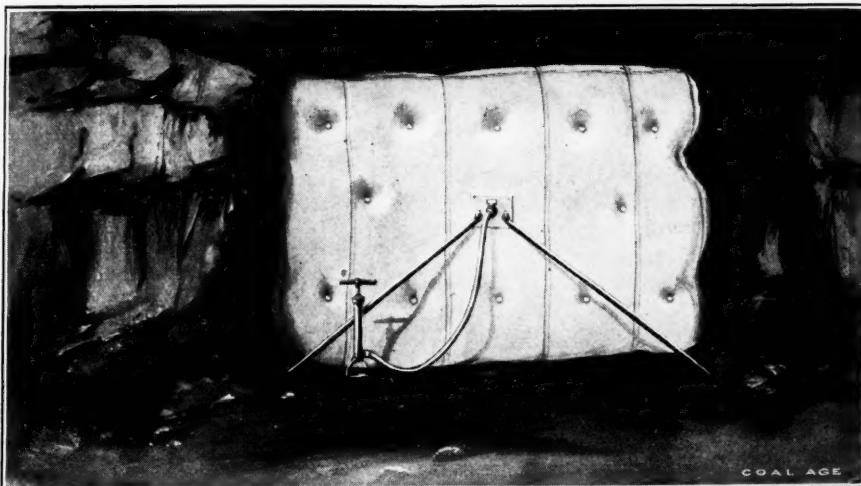
to ask or assume, what are the conditions of environment. No one will deny the practical impossibility of approaching sufficiently close to a raging fire, on the return side, to enable a stopping to be built in the return airway for the purpose of cutting off the circulation of air and confining the fire. The same is true where the return airway is completely filled with dense volumes of smoke and gases; unless, of course, the work can be done by the use of breathing apparatus.

On the other hand, no intelligent mining man will attempt to deny that whenever it is possible to get in and erect the first stopping on the return airway, and later close the intake, this is the thing to do. "Why?" Because the stopping erected in any portion of an airway will block the circulation of air. The stopping built on the return is just as effective in cutting off the flow of air past the fire as a stopping built on the intake.

The erection of the first stopping on the return, however, possesses the additional advantage that it confines the products of the combustion to the area of the fire. Not only do the expanding gases force back the air and, to a large extent, prevent it from reaching the fire; but the carbon dioxide (CO_2) produced by the combustion, renders the gases generated nonexplosive.

Again, suppose the first stopping is erected on the intake airway, under conditions that would have permitted its erection on the return. It is true the fresh air is cut off from the fire; but a very explosive mixture begins at once to form behind the stopping, in the region of the fire. It may happen that the sudden extinction of the flame of the fire, by the cutting off of the direct access of the air, will create a depression within the fire zone that will cause some air to enter the return openings before these can be closed. Now, while building the return stoppings under these conditions, the explosion of gas, or dust, in the case of a roof-fall within the area, is most liable to occur. This is what has often happened when the intake stoppings have been erected first and the return stoppings last.

It is almost idle to attempt to lay down rules or form a plan of procedure without having before us a plan showing the location of the fire, the course of the air current and the position of all crosscuts, stoppings and doors affecting the



AN AIR MATTRESS FOR CONFINING FIRES

In some gassy mines, square air mattresses, blown up by a hand air pump, as in the illustration, are utilized to make the first stopping. With these provided, in about four minutes the circulation can be stopped and the sealed-off territory reduced to a much smaller limit than could be done if the men had to build more elaborate stoppings in the smoke.

I inclose a rough sketch of such a pneumatic curtain. It can be folded up and quickly carried to the place affected. The mattress is 14 in. thick, and in its other dimensions is the size of the heading it is intended to fill. A central plate, with a pipe affixed thereto, permits the attachment of a rubber hose, through which the air can be pumped into the mattress for purposes of inflation. The bag stopping is supported temporarily by

ience, men of practice, men of theory; there are numberless and varied degrees and conditions in mines. The successful mining man today is a student of these conditions.

From the very nature of the case mine fires are dangerous; and the fire that has assumed proportions beyond control requires not only knowledge and experience, but, more than all, nerve, tact, a clear head, an instant grasp of all the conditions, and the ability to act promptly and with fortitude.

That such prompt, decisive, intelligent action at the Cherry mine, in the first stages of that terrible disaster, would have saved a large proportion, if not all, of the 256 lives then sacrificed, no practical mining man will deny.

In the present discussion it is proper

circulation. But in general it may be stated the air current should be short-circuited and, as far as possible, diverted from the fire by the erection of temporary canvas brattices. By the partial removal of one or two stoppings and the erection of a line of brattice, it may be possible in many cases to conduct sufficient air past the fire to the place where the return stopping must be built. In some cases a canvas sheet can be arranged in the return, ahead of the stopping to be erected, so as to throw the smoke and gases over the men engaged in the work. When the stopping is built nearly to the roof, this canvas must be removed and the work finished. The men in the meantime receive a sufficient supply of fresh air from a crosscut close to the stopping being built. The erection of the intake stoppings is then easily accomplished. In all cases it is necessary for the mine foreman in charge to exercise the utmost ingenuity, judgment and skill.

J. T. BEARD.

New York, Feb. 6, 1912.

Letter No. 26—I have read with interest the opinions on fighting mine fires, and I believe that since there is no established standard of occurrence for these fires that there cannot, accordingly, be any standard method for fighting them. The method of attack is determined entirely by local conditions, but must be decided upon quickly, since what otherwise may be a disastrous fire might be easily controlled if caught in the incipient stage.

I believe I have had an unusually bitter experience on an exceptionally discouraging piece of work of this character. This fire occurred in April, 1900, in the thin-vein district not far from Pittsburgh; it originated in an electric pump house which consisted of a wood-stopping on each side of the pump, between the intake and return airways, somewhat over a mile from the mine entrance.

One man was known to be behind the fire, and desperate chances were taken to effect his rescue. We tried to conduct a narrow airway along the rib so we could get near enough to force water on the fire. The roof had fallen for about 6 ft. above the coal along this section; so to get a support for our brattice we leaned rails, about 7 ft. long against the sides diagonally and pulled canvas over them. Only a few feet at a time could be gained, the smoke having backed up some 300 ft. against an air current of about 20,000 cu.ft. per minute, and the work was particularly trying, for in addition to the heavy smoke, the roof was continually falling. When we had reached a point about 100 ft. from the fire, a heavy fall occurred behind us, breaking down the brattice and cutting off our air, with the result that we were only able to escape with our lives.

A second attempt was made by nailing boards in the shape of an inverted L, to which the brattice cloth was attached and carried in. By this means we were successful in getting to within 25 ft. of the fire, when our brattice took fire and was consumed before we could get water on it.

It was now evident that all hopes of saving the miner had to be abandoned, and we turned our attention to smothering the fire. We entered through a door into the return airway, but were greeted by such a blast of heat, smoke, sparks and falling roof that we were compelled to retreat immediately. Crossing back to the intake airway, the door had scarcely been closed when an explosion occurred, the flame sweeping out over us as we dropped to the bottom. Fortunately, the flame was only of short duration, but it left the most surprised, frightened, disgusted and discouraged set of mine officials struggling in the mud, water and inky darkness that could be imagined. This explosion was caused, I think, by the accumulation of carbon monoxide near the fire after the door was opened.

We now closed off the intake temporarily with boards, opened our way into the return again by using canvas, and finally closed off both with brick stoppings. I think about 12 dams were then built, holes drilled from the surface, and the section flooded, which took several weeks.

I wish to add that the men working at this fire were all experienced and well posted mining men. One was a company inspector, another a mine foreman who a few years later was appointed state mine inspector, and we all should have known better than to have cut off the ventilation over the fire and then restore it again, as we did. It is a striking example of the difference between planning under assumed conditions, and actually working under any old conditions on a moment's notice, especially when human life is at stake.

J. T. COLBURN.

Uniontown, Penn.

Letter No. 27—I was much interested and pleased to see your issue of Feb. 3. The discussion on mine fires will certainly tend to clear up this much-talked-of question.

As far as I am able to judge, *Letter No. 2*, by Edw. H. Coxe, gives the solution to the question and the reason why in a nutshell. My own conclusions are: Place your men where they will not inhale the fumes. There is absolutely no more danger in sealing off a fire from the intake side than in any other work of that nature, as, for instance, in timbering-off and stopping-off a squeeze.

No official has any moral, pecuniary, or physical right to place his men in more than necessary danger to produce

the desired results of safety to life and protection to property. For half a century, I have been working in and about the mines—two-thirds of the time underground—and have worked at many fires. I always have, and in the future will continue to place my men first on the intake side. You can probably hurry matters by having the men build both stoppings simultaneously, but the workers on the return will suffer more or less from the effects of the fire, and the result will be bulging eyeballs, headache and nausea.

I was much interested in letter No. 5, which advocates fighting the fire from the intake side, but when it comes to sealing off the trouble, this gentleman recommends building the first stopping on the return. In this connection, let me say, the conditions are similar. Suppose a large amount of CH_4 is being generated in both headings. This gas drifting from the intake to the return over the fire will surely ignite and light the gas in the return. And furthermore, my experience has been it will keep burning until suffocated, or extinguished; or until the pressure of the blower is reduced to an intermittent one.

TWO FIRES IN ONE HEADING

I have had two fires in one heading, each one larger than a gas-grate, burn for 13 days and nights, until we forced up a crosscut on the other side. This gave us no fear, because the products of combustion were carried direct to the return and there was nothing to explode.

It is quite different with the argument put forth in letter No. 5. I can easily understand how the gas from the return could diffuse through the products of combustion, harmless enough until they reached the still smoldering fire; then there would be a flash, slight perhaps, but sufficient to knock down your men.

In sealing off a fire, we have three most important things to accomplish: 1. Suffocate the flaming gas by its product CO_2 . 2. Smother the coal fire by the inert pure CH_4 , and free N and the CO_2 products. 3. Make your stopping stronger than the pressure of the blower and the expansion of the heated gases.

I also notice that the "intake" advocates give reasons, while those who advise closing the return first are supported only by theory. Let me ask all coal men to read, mark and learn, and perhaps we may be able to save a life or two, even tomorrow. I am sure the valuable discussion that has occurred will cause hundreds of us to consider the methods outlined and be wholly prepared in case of emergency.

JOSEPH VIRGIN,
Supt. of Mines.
Plymouth, W. Va.

Mr. Norris Answers Mr. Garcia

Mr. Garcia has evidently misunderstood my letter, in regard to closing off a mine fire, in making his criticism.

In suggesting a procedure in the case of the evolution of large volumes of gas at the seat of the fire, I had in mind conditions not uncommon in the anthracite region when the full air current may be needed up to the moment of closing, to dilute the firedamp, and not merely the possible products of combustion.

I have too much respect for the character of your readers to assume that any one of them would be senseless enough to reverse an air current with the returns in irrespirable condition; the original assumption of a fire beyond control presupposes ample time in fighting it to obtain a knowledge of the state of the workings. Under proper conditions the air current *can and should be reversed*.

After all, the way to fight a fire is to get at it promptly and let the method of procedure be governed by the conditions.

R. V. NORRIS,

Consulting Engineer.

Wilkes-Barre, Penn.

[We expect to close the discussion on mine fires next week, when W. D. Owens, superintendent for the Lehigh Valley Coal Co.; J. C. McDermott, chief mine inspector for Montana, and others will express their opinions.—EDITOR.]

The Davy Lamp in Testing

I notice in COAL AGE, Dec. 16, 1911, p. 322, in answer to the question, "What is meant by the flame test?" you state the Davy lamp is a favorite lamp for testing for gas. In my travels I have found many who say the Davy lamp is unsafe, owing to its liability to flame, and in some localities it is prohibited by law. Why is the Davy lamp so often preferred, when the Wolf lamp will show $\frac{1}{4}$ per cent. of gas, and is called safe in all countries.

J. H. NEEDHAMMER, SUPT.

Sullivan, Ind.

The Davy lamp, owing to its simplicity of construction and sensitiveness to gas, has always been a favorite lamp among firebosses and still holds its prestige. It is not a safe lamp to place in the hands of an ordinary miner, and is not adapted to general work at the face. The use of the unbonneted Davy is prohibited by the old mining law of Great Britain. The new law, which will probably go into effect not later than Jan. 1, 1913, does not mention the Davy or any other lamp specifically, but requires that no lamps shall be used in any mine other than those provided by the owner of the mine and approved by the Secretary of State.

In the United States, as far as our knowledge goes, the only prohibition by law of the Davy lamp or any other lamp,

occurred in the old bituminous-mine law of Pennsylvania, which forbade the use of the Davy and the unbonneted Clanny lamps for general work in bituminous mines, but permitted their use by mine officials, examining the mine for gas.

Because of the free circulation of air in the lamp, the inside atmosphere of the Davy most closely approaches the same gaseous condition as that of the air surrounding the lamp. The flame cap, however, as is well known, is not visible in this lamp until the gas reaches 2 per cent., and many firebosses fail to detect a cap in less than 3 per cent. of gas. For this reason an indicator should be used in the Davy, capable of showing small percentages of gas.

The Wolf lamp burns naphtha, a highly volatile oil that reveals a flame cap at about $\frac{1}{2}$ per cent. of gas. The indication of $\frac{1}{4}$ per cent. of gas, as stated by our correspondent, is extremely uncertain and not apparent to most observers. The lamp is not a good testing lamp for several reasons; namely, the lamp is bonneted, which fact, together with the vaporous oil burned, modifies, at times, the atmosphere in the combustion chamber, so that it does not truly represent the gaseous condition of the outside air. The lamp heats readily in gas, the oil volatilizes more quickly and the lamp gives higher indications than it should, after being exposed to gas a short time. The lamp flame is easily extinguished, and when relighted, after a short period of extinction, the lamp may flash (pass flame).

Opinions vary in regard to the use of naphtha or other highly volatile oil in mine lamps. The slightly improved illumination scarcely compensates for the increased danger arising from the explosive nature of the oil burned. The same difference of opinion exists in regard to the use of the various carbide or acetylene lamps. At the present time, electric lamps are receiving much attention. The chief objection to electric lamps, however, is their inability to reveal the gaseous condition of the mine air.

Mine Telephones as Life Savers

Relative to the explosion at our mine No. 7 at Radley, Kan., on Jan. 3, in which it was reported that the two shotfirers, J. W. Keenan and W. M. Martin, were saved from death by means of the mine telephone, I wish to state, in my opinion, this is correct. We have a mine telephone law in this state which went into effect last fall, and all of our mines are equipped with telephones.

In regard to this particular accident would say that the mine telephone undoubtedly resulted in our being able to save the lives of these two shotfirers. In all of our mines we have a system of requiring the shotfirers to report by

means of the mine telephone to the night engineer, the progress of their work as they go through the mine lighting the shots; by this means we know at all times just about where the shotfirers are. The night engineer also becomes thoroughly acquainted with just the manner in which the shotfirers fire the mine, and knows just when, within a few minutes, a certain shotfirer should report from a certain station. In the event that he fails to report the engineer suspitions something wrong, and when this runs over ten or fifteen minutes past the usual time he summons help.

At the time of the explosion in our mine No. 7 we had, in addition to the regular mine telephone, installed a telephone in a refuge hole for the shotfirers. This refuge hole was provided with a door, the idea being for the shotfirers to light a certain entry and get in this refuge hole while the shots were going. The particular entry for which this refuge hole was installed had been giving us considerable trouble in the way of windy shots, and we, therefore, took this additional precaution.

When the explosion came one of the shotfirers was in the act of ringing the engineer to tell him that they had lighted the shots in this entry. The force of the explosion was so strong that it blew in the back end of the refuge hole, and the shotfirer did not even get to talk, but was immediately overcome by the after-damp. His partner, who was with him, was likewise overcome. The night engineer, knowing that this was the station from which they should next report, immediately tried to call them, but was unable to get any response and started the distress whistle. In fifteen minutes after the explosion had occurred a rescue party was in this refuge hole and had the two shotfirers out working upon them and succeeded in resuscitating them. A little later it would undoubtedly have been impossible to revive them.

I might say that our mine telephones are so installed that they are practically explosion proof, the wires being laid in pipe along the entry. We have had three quite severe explosions in this particular mine this winter and none of the telephones was damaged in the least.

C. W. WATERMAN,
Pittsburg, Kan. Mine Supt.

Question on Shot Firing

Discuss briefly the question of the advantages arising from, and the risks incident to, the very common practice of firing two or more shots at the same time, in an entry or room.

Seanor, Penn. J. N.

[At the earnest request of a correspondent we submit the above question for discussion, and hope the readers of COAL AGE will respond freely and give the results of their experience or state their own views.—EDITOR.]

Inquiries of General Interest

All Questions Must be Accompanied by Name and Address—Not for Publication

Cross-Bar Timbering in Mines

We have had some considerable trouble in our main-haulage-road timbering. The cross-bars, which are a good quality of straight-grained, white oak, seem to have a tendency to split at the notch, as I have shown in the rough sketch (Fig. 1) I am sending you. Can you or any of the readers of COAL AGE tell me the trouble and suggest a remedy? We have a rather weak, shale roof and a soft fireclay bottom. The coal (bituminous) is 5 ft. 4 in. high and overlaid with a 10-in. draw slate that falls a few yards behind the face and before the timber frames are set up.

The air cuts the roof at each rib badly, and then the trouble with splitting of cross-bars begins. Please explain why the roof cuts at the ribs where the velocity of the air is less than at the center.

Pittsburg, Kan. ANXIOUS FOREMAN.

From the excellent sketch (Fig. 1) you have sent us, there appear to be at least two main reasons for the splitting of the cross-bars at the notches. (1) The cross-bar appears to be tightly wedged its entire length. (2) The legs are not properly jointed to the cross-bar. These causes are probably greatly augmented in their effect by the cutting of the roof at each rib.

When roof "cuts" it is almost invariably along the ribs of openings. It occurs more generally in entries and passages where a good current of air is traveling and less frequently in rooms. The trouble is commonly attributed to the air current, which is said to "cut the roof"; but this does not express the reason for the cutting.

Cutting occurs chiefly in mining coal under a roof that disintegrates readily under pressure; or in other words, crumbles under excessive roof pressure. This crumbling is greatly augmented by the action of the air current on the moisture escaping from the stone, slate, or shale. The action is greatest along each rib, because that is where the crunching of the roof is greatest. The crumbling of the strata at the rib, however slight, facilitates the escape of moisture, which in turn assists the disintegration. The cutting is thus largely due to excessive roof pressure, for the particular roof in question. Its remedy must be sought in: (1) enlarging the entry pillars and stumps; (2) reducing the length of

rooms and carrying a smaller area standing on props; in other words, shorten the time rooms must be kept open, draw back pillars and let roof fall as quickly as possible in the rooms; (3) a proper system of timbering.

The cutting of the roof at the rib lines throws an extra burden on the cross-bar, and the manner of wedging the timber its entire length, as shown in Fig. 1,

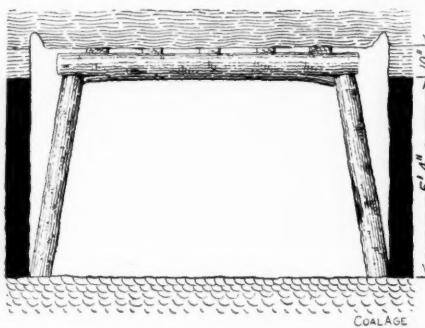


FIG. 1. WRONG METHOD OF WEDGING AND NOTCHING A CROSS-BAR, CAUSING BAR TO SPLIT

makes the bar take the whole weight over the span and naturally bends the bar and starts the splitting at the notches.

WEDGING A TIMBER FRAME

Observe in Fig. 2 there are no wedges driven over the central portion of the span; but two good flat wedges are

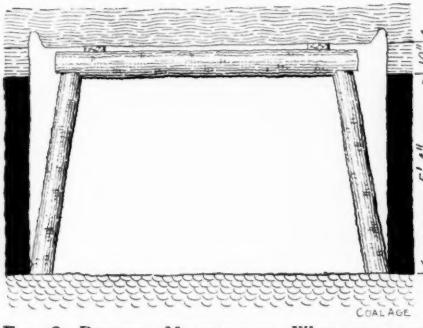


FIG. 2. PROPER METHOD OF WEDGING AND NOTCHING A CROSS-BAR

driven, one on each side, just in from over the top of the leg. The effect of this is to arch the weight over the span, throwing it on the legs at each side, and leaving the cross-bar free to resist the thrust of the legs inward with its entire strength.

NOTCHING A CROSS-BAR

When setting up a timber frame first take down any loose rock or slate that should not remain; clear away rubbish and cut a solid foothold on the floor

against each rib where the timbers must stand. Now, measure the spread of the legs at the floor, inside of timbers, and the vertical height from the floor to the under side of the collar, allowing for the thickness of the collar and wedges. From the inside spread of the legs at the floor subtract from 3 to 4 inches, for each foot of height; and the remainder will be the distance between notches. The collar or cross-bar must be sufficiently longer to allow a full bearing for the head of each leg.

It is important to cut the notches on an angle of 45 deg. and make a smooth flat bearing for the head of each leg. The top of each leg must then be sawed to fit this bearing as shown in Fig. 2. By this arrangement each leg will lean toward the center of the entry from 1½ to 2 inches for each foot of headroom under the collar.

Gases Distilled from Coal Dust

Assuming a coal dust having the following proximate analysis:

Moisture	1%
Volatile matter	28%
Fixed carbon	63%
Ash	8%
	100%

and supposing the temperature of the dust to be gradually raised without bringing it into contact with flame; in what order will the various gases be distilled and at what approximate temperatures?

Lethbridge, Canada. ENGINEER.

Coal exposed to a free atmosphere gives up much of its moisture. It also loses some of its occluded gases if such are present. This emission of moisture and gas takes place at all temperatures until saturation of the surrounding atmosphere occurs. As the temperature is raised the emission becomes more rapid.

It cannot be definitely stated at what temperature oxidation begins, since coal absorbs oxygen from the air and it is possible the absorbed oxygen enters into combination with some of the elements of the coal. But, sensible combustion of carbon with production of carbon dioxide, or carbon monoxide, or both, according to conditions, occurs at about 300° to 350° F. The temperature at which spontaneous ignition of fine coal dust will take place must, evidently, depend on the nature of the coal and the fineness of the dust. This temperature is given as 284° F. (Bedson); 356° F. (Fayal), Mine gases and Explosions, page 155.

Examination Questions

Selected from State Examinations, or Suggested by Correspondents

Interesting Questions for Beginners

BELT-DRIVEN VS. DIRECT-CONNECTED FAN

Ques.—What are the advantages and disadvantages of a belt-driven fan?

Ans.—The belt makes it possible to attain any desired speed of fan for the same speed of engine by changing the pulley on the fan shaft or on the engine. It is also plain that the belt-driven fan runs more smoothly and is not as hard on the engine as a direct-connected fan. When the fan is belt driven, it is possible to employ a smaller size of engine run at a higher speed for any given power and speed of fan. The chief advantages of a direct-connected fan are: The fan is under better control; and there is no loss of power by the slipping of the belt.

SIZE OF DRILL—SOLID SHOOTING

Ques.—What size of drill (diameter) would you recommend to be used when shooting off the solid?

Ans.—In shooting off the solid, it is particularly desirable to avoid the use of too large a drill. The diameter of the bit should not exceed 2 or $2\frac{1}{2}$ in., depending on the hardness of the coal. It must be remembered that the diameter of the hole is always greater than the diameter of the cutting bit. A drill hole of too large a diameter causes too great a localization of the charge and produces what is known in mining as a tight shot, which may blow the tamping instead of breaking down the coal.

MINE-HAULAGE SYSTEMS

Ques.—What system of haulage would you consider best adapted for mines, under the following respective conditions: (a) When the haulage roads have an uneven grade? (b) When there is a grade of 5% against the loads? (c) When the haulage roads are fairly level?

Ans.—(a) When the grade of the haulway is uneven or variable, the tail-rope system is generally preferred as being more readily controlled.

(b) For a grade of 5% against the loads, a combined gravity and engine-plane system should be employed, in which the weight of the descending empty cars would partly balance the weight of the ascending loads; and to that extent relieve the load on the engine.

(c) When the haulage road is practically level, the endless-rope system gives the best results.

MINE GASES

Ques.—In dealing with carbureted hydrogen, is any other danger to be guarded against besides that of explosion?

Ans.—The possible ignition of the firedamp that is formed when this gas is mixed with air in certain proportions is the chief danger to be feared in dealing with marsh gas, CH_4 (carbureted hydrogen). Pure marsh gas undiluted with air would, of course, suffocate, as it contains no available oxygen; but this danger is not possible in any ventilated workings. The gas diluted with air produces no ill effect when breathed, except it may be a slight dizziness if much gas is present.

COMPOSITION OF ATMOSPHERE

Ques.—Of what is atmospheric air composed?

Ans.—The composition of pure air, by volume, is: nitrogen, 79.1%; oxygen, 20.9%; and small amounts of carbon dioxide, moisture and other rare elements, which it is not important to mention.

EFFECT OF TEMPERATURE IN MINE

Ques.—If the temperature of a mine passing a large volume of air is 50° F., while that of the outside atmosphere is 80° F.; (a) what effect will this difference of temperature have on the circulation of the mine? (b) In what other way will it affect the condition of the mine or airways?

Ans.—(a) In a slope or shaft mine, or in a drift mine ventilated through a single shaft sunk back on the hill, this difference between the inside and outside temperatures will create an air column that will either assist or oppose the circulation. In the one case, the installed or artificial circulation will be supplemented by a certain natural current, increasing the circulation in the mine; in the other case, the natural agency will oppose the artificial means and the mine circulation will be reduced thereby.

Wherever practicable, the artificial circulation should be arranged to conform to the natural circulation during the winter season, when the inside temperature is above that of the outside air, as the mine activities are greater then, and the mine has greater need of an ample supply of air.

(b) The air entering the mine at 80° F. may carry sufficient moisture to exceed its capacity when cooled to 50° F. In that case, there will be, at times, a considerable amount of moisture deposited on the

walls, roof and timbers in the airways; and, at other times, when the outside air is drier and carries less moisture, the air current in passing through the mine will take up moisture. This alternate wetting and drying of the mine timbers rots the wood and shortens the life of the mine timber. The same wetting and drying is hard on some mine roofs, causing the roof to crumble and crack.

EFFECT OF PRESSURE ON FIREDAMP

Ques.—Is firedamp compressible; and how is it affected by a decrease of atmospheric pressure?

Ans.—Firedamp being a gaseous mixture is compressible, as are all gases and air. Gases are compressed by any increase of pressure, and expand when the pressure is decreased, the compression or expansion being in the inverse ratio of the absolute pressure. For example, 29,000 cu.ft. of firedamp in an abandoned room in a mine, is expanded to 30,000 cu.ft. when the barometer drops from 30 in. to 29 in. These ratios are expressed as follows:

$$\frac{2d}{1st} \frac{volume}{volume} = \frac{1st}{2d} \frac{pressure}{pressure}$$

$$\frac{30,000}{29,000} \frac{cu.ft.}{cu.ft.} = \frac{30}{29} \frac{in.}{in.}$$

In this case, the difference 30,000 — 29,000 = 1000 cu.ft. of firedamp would be forced out of the room into the entry. If this fall of barometer took place in, say 10 hours, every 29,000 cu.ft. of space in abandoned rooms in the mine would furnish 100 cu.ft. of air or gas per hour during the fall. In gaseous mines this often causes serious trouble by rendering the mine air highly explosive when least expected by men underground.

STOPPING OFF AIRWAY, EFFECT ON FAN

Ques.—If an air-tight stopping be erected in the main-return airway 100 ft. from the fan, what effect will be produced on the fan?

Ans.—The erection of the stopping in the main return will stop the circulation of air, and no air will pass through the mine or the fan. Now, assuming the power applied to the fan shaft remains unchanged, the fan will run faster after the stopping is built than before; because, there being no air passing, no work is lost or absorbed in the fan and all the power is now available for turning the fan. Hence, for the same power, the speed of the fan is increased by stopping off the air course.

Sociological Department

For the Betterment of Living Conditions in Mining Communities

The Other Half

BY CHARLES L. FAY*

In these days of social unrest, there are many organizations and committees, which have come into existence aiming to be mediums through which the prime-moving spirits may have an opportunity to express in deeds their overwhelming conviction of the need that something should be done to contribute toward a clearer understanding of present social conditions, and to aid in the betterment of society.

Usually a fitting background is arranged by securing the coöperation of men and women of superior character and of a national repute in such matters as pertain to civic progress, philanthropy and humanitarianism. Too often, perhaps, both the men and women, whose wealth or position, integrity or state or national standing make them leaders, lend their names and nominal interest to an enterprise while the policy and the labor of development are left to the discretion of the zealous promoters. This occurs, possibly, because the *objective* of the plan is noble and the *principle*, in general, well established. It is easy to enlist approval from those who are already too active in other lines to contribute any personal assistance or direction in the promotion of the enterprise, but it is not easy to secure their effective support.

Having proceeded thus far, under the influence of an earnest and honest enthusiasm, and under the spell of genuine oratory and devotion, the development of the organization is delegated to *specialists* who, of necessity, have created the movement, or are related to it in a professional way.

SURVEYING A LA MODE

Thus we have committees, foundations and societies with general offices, branch offices, national and state divisions, equipped with publishing houses, official organs, publicity bureaus and corps of statisticians, writers and investigators. Conventions and conferences are numerous. Surely in this day "one-half the world is seeking to find how the other half lives."

Of the making of "reports" there is no end. Many thousands of dollars annually lubricate the wheels of that machin-

ery which ceaselessly grinds out data wherewith to fill reports that other data may be secured, from which other reports may be made and further investigation aided. Additional conferences are held, happily around the banquet board, to call yet more conventions that other lengthy reports may be fruitful in yet more brilliant oratory, influencing still further investigation whereby remedy may be discovered for social ills, and the *other fellow* made unselfish.

THE SURVEYED

Surely one-half of the world is striving to show the *other half* how to live and pursue happiness. The *other half* ought, at least, to be very grateful for the self-sacrifice and unselfish devotion of the mighty host which labors so diligently over mahogany desk, on pullman car and around the banquet board for so great a purpose!

Who compose the *"other half"*? The captains of industry, the employers and the industrial workers, the courts, the law makers and the guardians of the peace, the churches and the public schools. Of course, the courts, the law makers, the guardians of the peace, the churches and the public schools are only in a degree part of that *"other half."* That is, they belong to it only in their relations with the "hewers of wood and the drawers of water"—the industrial workers.

What an impressive spectacle it would make if the mighty army of social betterment specialists with their equipment could form in one general convocation at a point where the *"other half,"* from ocean to ocean, could see the men and women—in their world but not of their world—studying, working and investigating unselfishly for their benefit. Surely there should soon be no *"other half"*—selfishness would be swallowed up in unselfishness and segregation would be displaced by coöperation.

Let us look more directly to the operators or specialists of this product of social unrest and to the methods they employ, in order to discern if we may, some obstacles to the progress of truth and civilization.

MANY REMEDIES

All realize that the social unrest is the evidence of wrong social conditions, but like the experts of various schools of medicine, each "school" for social betterment seems to diagnose the case

differently and then prescribes its own remedies, while the *"other half"* cries out "Oh, wretched man that I am!" and Job, as he listened to the advice of his three officious, self-satisfied friends, is better understood.

One specialist says to the *"other half,"* you must combine and *fight* for your rights. Another says, you must develop "class consciousness"; another teaches "class hatred"; another directs the *"other half"* to recreation, amusement and contentment with its lot and place in society, and still others teach paternalism and the high ideals of coöperation. There is anarchy, political socialism, trade unionism and coöperation battling against corporate and individual (assumed or established) prerogatives and the spirit of selfishness and segregation.

All the while "investigation" is followed by "investigation" while agitation is epidemic. The *"other half"* will soon be resigned to the operating table. All this is but an illustration of the difficulties under which truth has to progress, through the débris of human *miscomprehension*.

I would not minimize the wrong conditions that exist nor undervalue the great aid that various social-welfare organizations, committees and foundations are to the progress of society. Society is debtor to the self-sacrificing and intelligent efforts of many welfare specialists; but it *will not* be amiss to call attention to some types of superficial investigation that contribute to the development of wrong and biased public opinion which, consequently, is based upon wrong conclusions and not upon facts.

The specialists specialize *apart* by "schools" and humanity pays the price of its own *temperamental divisions*. Let us consider, then, the individual investigation—the *dynamic* of every organization, society and committee.

STEINER'S INDUCTIVE METHOD

Would that we had more Dr. Steiners—men who contrive to *live in the stratum* of the society they would investigate and then labor to aid in its uplift! Dr. Edward A. Steiner studied the immigrant races in North America as an *immigrant*—*lived the life*—*was the life* of the society he came to benefit—when he *investigates* he does it with a comprehension of the lives of the men he would *uplift* and a consciousness of the values of the social status to which he would lift them.

(To be continued)

*Mining Secretary, Penn. State Y. M. C. A., Wilkes-Barre, Penn.

Coal and Coke News

From Our Own Representatives in Various Important Mining Centers

Washington, D. C.

The Senate committee on inter-oceanic canals has just published the proceedings of its investigation into the use and distribution of coal on the Isthmus of Panama, made during the recent visit of the committee to the Canal Zone. It appears that considerable attention was devoted to the coal question and particularly to the position of the Panama Railroad Co. with regard to it. No one is allowed to sell coal in the Canal Zone except the railroad, although there is no regulation or law that prohibits anyone from so doing. While there are a few small dealers in charcoal, there is no other dealer in bituminous coal either small or large.

The price of coal is fixed by the president of the railroad who determines the rate at which it shall be sold commercially to ships. A profit of about 33 1/3 per cent. is made when the coal is sold to private individuals. The Pacific Mail Steamship Co. and the Bates & Chesebrough line are furnished coal at the same price at which the Canal Commission buys it and the profit on this coal is a small one, amounting to not more than 5c. or 10c. per ton.

RECOMMENDATION BY COL. GOETHALS

Colonel Goethals urges that the government should arrange to furnish coal to private shipping and estimates that for the use of the navy alone, a storage capacity amounting to 200,000 tons, with a maximum increase of 50 per cent. should be provided on the Atlantic side and that provisions for storing 50,000 tons of coal with a possible increase of 100 per cent., should likewise be made on the Pacific side of the canal. He thinks that the government would be able to sell coal to private vessels and regularly replenish its supply so as to keep on hand a constant residuum, representing the amount needed by the navy on the basis of the figures indicated.

Considerable attention has also been given to the question of supplying petroleum for fuel use by vessels and to the best methods of storing and handling this material.

The data filed with the House Committee on Interstate Commerce relative to the rates for coal charged by the Panama R.R. Co. are considered to show that these charges are unreasonably high in so far as they apply to private commercial buyers on whose coal the Senate

testimony showed that a profit of about one-third was being made. The present indications are that new legislation relating to the Panama Canal will call for a governmental system of selling coal that will be somewhat like the plan that has been outlined by Colonel Goethals.

PUBLIC COAL LAND IN ALABAMA

The Senate, on Feb. 5, passed a bill that extends the operation of the act of June 10, 1910, to cover coal lands in Alabama. The bill, as now before the House, is as follows: "That all the public lands containing coal deposits in the state of Alabama which are now being withheld from homestead entry under the provisions of the act entitled 'An act to exclude the public lands in Alabama from the operations of the laws relating to mineral lands,' approved Mar. 3, 1883, may be entered under the homestead laws of the United States subject to the provisions, terms, conditions and limitations prescribed in the act approved June 10, 1910."

JOINT RATES AND REBATES

The Interstate Commerce Commission has rendered a decision in the matter of divisions of joint rates for transportation of coal to points in North Carolina from points in other states, in which it finds that:

"1. The doctrine that this Commission has no concern with the divisions of rates which carriers make by agreement with each other has decided limitations, and if a railroad is a shipper, or is so linked up with a shipper that a division of a rate means a rebate or a discrimination in favor of or an advantage to a shipper, this Commission may properly look into the nature of the service which the carrier gives and the division which it receives.

"2. Where the industry-owned carrier, by virtue of a trackage agreement with a trunk-line carrier, conducts its operations in part over the trunk line's rails, that fact becomes an additional reason why this Commission may take cognizance of the divisions of joint rates to which the industry-owned carrier is a party."

MINE RESCUERS BILL PASSED

A House bill extending to the employees of the Bureau of Mines the right to receive compensation from the government for injuries received while on duty was passed, Feb. 5, by the Senate. The bill now goes to the President.

California

Amador—Sixty-five miners were imprisoned, Feb. 7, by a cave-in at the Bunker Hill mine, near Sutters Creek. The men were entombed at the 200-ft. level of the shaft. A rescue party was able to get into communication with them by the following morning. None of the men were injured, and their chief danger lay in the possibility of another cave-in. The Bunker Hill mine is one of the oldest and most famous mines in California. The accident was due to the collapse of timbers that were rotted with age.

Colorado

Denver—The state land board proposes to regulate the price of coal mined from state land leased to operators. The Consumers' Coal Co. has applied to the board for a lease on school lands at a point 20 miles north of Denver, and was informed that the company must agree to sell coal in Denver at a price not to exceed \$4 per ton. The company was willing to agree to a proposition that it should not seek more than 50c. a ton profit by the sale of the coal, but the board wanted it understood in the agreement that a charge of not more than \$4 per ton, delivered, should be made in Denver. The matter was taken under consideration by the company.

Lack of activity on the part of state officials to afford protection to the non-union men working in the northern coal fields and the failure of the state administration to compel the sheriff of Boulder County to maintain order there have forced the operators to seek Federal protection. Recently the Rocky Mountain Fuel Co. filed an application for an injunction in the United States district court to prevent members of the United Mine Workers of America from interfering with employees of the company and the company itself at its mines in Louisville, Marshall, Lafayette, Superior and Erie. Final hearing in the case will be held Feb. 19. Arguments will then be presented as to whether a permanent injunction shall issue. Action upon a temporary injunction was practically waived by the company.

Illinois

Bellefonte—Freeburg, about eight miles southeast of here, has almost been depopulated recently on account of a practically complete suspension of operations in the coal mines there. The men have

gone to Belleville, French Village, O'Fallon, Collinsville and other coal-mining centers for employment. The suspension at the mines, it is said, is due to the inability of the operators to obtain railroad cars for the shipment of their output. Operators say the Illinois Central, whose freight service is said to be crippled as a result of the strike of the shopmen, has been furnishing only about one car to each of the four mines at Freeburg once a week.

Paris—It was announced recently that a seam of coal has been found on the Morton farm, near Nevins, at a depth of 610 ft. The vein is 6 ft. thick, with a sandstone roof 14 ft. in thickness. The same vein has been struck, in boring for oil, in the same township at a depth of 784 ft. Two other seams of minor importance were struck, one at 370 ft. and one at 404 ft. It is reported that representatives of the United States Steel Corporation are securing leases in the vicinity and will investigate the field.

Danville—On Feb. 9, the hoisting wheel at the Fairmount Coal Co.'s mine at Bennett Station broke and a cage dropped a short distance and stuck in the shaft. No one was injured, but there was no way left for getting the miners out because the air shaft was blocked with ice. After being imprisoned for 15 hours, the 50 miners were released by a rescue party that succeeded in chopping the ice from the air shaft.

Springfield—About 800 miners recently went on strike at Witt, near here, and 200 more, at Kortkamp, were also induced to strike. The men of Burnwell No. 2 mine, at Witt, demanded the discharge of a mule boss, against whom they had a grievance and the company refusing to accede, a strike was declared. Efforts to effect a settlement have been unavailing.

Indiana

Gary—Eight of the ten blocks of by-product coke ovens being built at the U. S. Steel company's plant, have been completed. This means that about 450 ovens are in operation. The completed plant will consist of 560 ovens, with a daily capacity of 7000 tons.

Indianapolis—Representatives of the Western Federation of Miners and of the United Mine Workers of America held a meeting in Indianapolis, Feb. 7, and effected a tentative organization of a miner's department of the American Federation of Labor. Charles H. Moyer, of Denver, Colo., president of the Western Federation, was elected head of the new department.

The announcement that a railroad will be built from Gary to Vincennes makes the outlook bright for the development of the coal fields in Knox and Gibson Counties, Indiana. Discoveries, within

the last few months, of a vein of coal of excellent quality, together with the steady operation of existing mines is said to have induced the Steel Corporation to extend its railroad connections. The Indian Creek Mining Co., which recently opened one of the best equipped mines in the state, is now employing several hundred men. Two additional shafts are to be sunk in the spring. New mines are also being opened in Gibson County near Bicknell.

Kentucky

Barbourville—The Clover Fork Coal Co. has the grading done for its incline at its new mine on Clover Fork above the town of Harlan. The spur line of railroad being constructed up Clover Fork, to the property of the Clover Fork Coal Co. and the Harlan Coal Co. is completed for a distance of between one and two miles and work is going forward as rapidly as the weather will permit.

Lexington—A bill has been introduced in the Kentucky legislature that provides for a tax assessment of one cent on every ton of coal mined.

The Commercial Club of Lebanon, Ky., has filed a protest with the Interstate Commerce Commission complaining that the rates on coal over the Louisville & Nashville R.R. from Big Stone Gap and Norton, Va., and from the fields in Tennessee are unjust and discriminatory.

Louisville—Benham, another of the magic cities of the eastern Kentucky coal fields, that has sprung up as a result of the rapid local development, has now a population of about 3500. Benham is on the newly completed line of the Wasioto & Black Mountain R.R. and was started by the Wisconsin Steel Co. The Wasioto & Black Mountain is being pushed into Harlan County and the population of Harlan is expected to double in the next 12 months. Dozens of small towns are springing up in that section. Poor Fork is developing into a mountain metropolis. In time, it is said, the Wasioto & Black Mountain will be extended to the head waters of the Cumberland, where rich coal fields abound in the upper Black Mountain section.

Following the announcement from the coal mines in Kentucky that they were unable to secure cars from the Illinois Central R.R. for commercial shipments of coal, railroad officials claim that they are now furnishing the mines with cars and that coal is being received for revenue shipments.

Michigan

Corunna—The Kerby Coal Mining Co., with property consisting of \$35,000 in coal leases, and owned principally by Tod Tincaid, of Detroit, has been dissolved on application of S. Q. Pulver, a stockholder. The company never engaged in mining.

Detroit—This city's threatened coal famine assumed a more serious aspect, Feb. 1, when announcement came from the Detroit City Gas Co. that the supply of coke was at the point of exhaustion. At the same time it was learned that the Solvay Process Co. is away behind in its supply of this commodity. Serious shortages of coal supply are reported from throughout the state and the situation at many points threatens to become critical in the event of continued cold weather and lack of relief in the matter of transportation.

Missouri

St. Louis—Traffic representatives of the railroads interested in the proposed abolition of the arbitrary on coal within a 100-mile radius of St. Louis met recently in the offices of General Manager McKeen, of the Vandalia. This was the second conference held in an effort to arrive at an agreement by which the roads could meet the demands of the Business Men's League Traffic Committee. According to Mr. McKeen, nothing definite has been decided. He could not predict, he said, how soon an agreement among the railroads would be reached.

North Carolina

Charlotte—William Guthrie, of Durham, acting for a Philadelphia syndicate, has completed a deal for the purchase of the Cumnock coal-mine property in Chatham County, embracing 2700 acres of land and the only coal mine in North Carolina. The purchase price is given as \$60,000. The mines, where a low-grade bituminous coal is found, will probably be developed. They have not been worked for several years, the low-grade coal not competing for most purposes with the West Virginia and Tennessee product.

Ohio

Canal Dover—Surveyors employed by the Pennsylvania R.R. Co. are at work on what is believed to be a proposed extension of the Cleveland & Marietta division of the system, to connect with the Cleveland, Akron & Columbus division at Orrville, giving the line a river to lake route. The line would be about 30 miles long, and would lessen the haul to Cleveland from the coal fields along the Cleveland & Marietta branch by about 25 miles.

East Liverpool—The West Point Coal Co., which operates several mines on the Youngstown & Ohio River R.R., six miles north of this place, plans to establish large coal-storage yards here to develop the trade among nearly 50 potters in the vicinity. The West Point Coal Co. was organized several years ago by J. L. Francis, of Chicago, and it was only after his preliminary surveying

of nearly 20,000 acres of land in the central part of Columbiana County that it was known that large deposits of coal existed there. As soon as the Youngstown & Ohio R.R. Co. can establish a switching arrangement with the Cleveland & Pittsburgh railroad, the West Point Coal Co. plans to ship the greater part of its product south by the Ohio River.

Oklahoma

Coalgate—The shaft of the new mine being opened here by the coal department of the Missouri, Kansas & Texas Ry. has been completed and one of the best veins of coal in the Southwest developed. It is expected that the new mine will be in operation within a few weeks and employment given to 300 miners. The completion of the shaft was celebrated by firing a number of shots of dynamite.

Pennsylvania

BITUMINOUS

Irwin—The coal trade is now at about capacity production in the Irwin district. The Yukon mine, shut down to make repairs, started, Feb. 6, and 600 men returned to work. The Pleasant Valley mine, north of town, is now running, after an idleness of nearly two years. Edna No. 1 and No. 2 mines of the United Coal Co. have twice as many hands employed now as on Jan. 1. Operators declare the Pennsylvania railroad is doing wonders in moving coal to the markets during the extremely cold weather.

Scottdale—The old Dexter coke plant, near Scottdale, together with the underlying coal, was recently transferred from the Stauffer estate to Connellsburg interests for the sum of \$30,000. The deal includes the coal under several tracts in Upper Tyrone township, the complete equipment of 40 ovens, all in good repair, and the necessary mining rights and trackage. The new owners are said to be making preparations to at once get the plant ready for a steady run. It has been idle since the slump in the fall of 1907.

Ebensburg—Local owners of coal land have been interested lately in the activities of two men who have been endeavoring to secure options on a 5000-acre tract of coal lying immediately northwest of Ebensburg. It is not known what interests they represent, but the name of J. Blair Kennerly, of Philadelphia, has been mentioned in this connection. Mr. Kennerly owns mines in Cambria, Clearfield, Blair and Indiana Counties.

Pittsburg—The brief of former Attorney-General Wade H. Ellis, as chief counsel for the Pittsburgh district coal operators, against the freight rates to the lake ports of the coal-carrying railroads, was filed Feb. 6, with the Interstate Com-

merce Commission in Washington. The arguments will be heard on Feb. 19, and a heated discussion is forecasted by the claims made in the brief.

Fire, Feb. 9, partly destroyed the tipple at the Grant mine of the Pittsburg Coal Co., at the west end of Carnegie. The damage is estimated at \$500. The fire caused great inconvenience to the Pittsburg, Cincinnati, Chicago & St. Louis Ry. Co., as it ordinarily uses the tipple for coaling engines several hundred times a day.

ANTHRACITE

Scranton—The big modern breaker and the steam plant of the Connell Anthracite Mining Co., at Bernice, were destroyed by fire, Feb. 2, entailing a loss of \$150,000, fully covered by insurance. The breaker being some distance from the head of the shaft, the lives of the men inside were not endangered. Live coals falling on oil soaked woodwork or an overheated boiler is believed to have caused the fire. It started in the boiler room and quickly spread to the breaker proper and then to the office building adjoining. The colliery buildings were all comparatively new, having been erected since the opening of the Bernice coal field not many years ago. The fire throws over 500 men and boys out of employment.

Wilkes-Barre—Work is well underway upon the new Stackhouse breaker that is being erected in Salem township near the Shickshinny line about 11 miles above Berwick. The breaker will cost approximately \$80,000 and will be one of the most modern in Luzerne County in construction and equipment, being electrically driven throughout. The new operation is looked upon as a big boon to Shickshinny.

Pittston—Eighty mine workers from the Pittston district are to receive first-aid instructions from the Federal Bureau of Mines. One of the mine-rescue cars arrived in this city recently, and is stationed near the Erie depot. It is in charge of Daniel D. Davis.

Tennessee

Briceville—The output of the Cross Mountain mine of the Knoxville Iron Co., in which an explosion occurred last December, killing 84 men and imprisoning 5 more, has been increased to 200 tons per day. It is working now full time and is employing all of the miners who apply. More could be used. The mine and the village of Briceville are just now beginning to assume their normal attitude.

West Virginia

Fairmont—It is said that with the opening of spring, 1500 men will be brought into this section to mine coal. Several mines that have been closed down lately will resume work and the outlook in the coal industry for this sec-

tion is exceedingly bright. The additional men will work in the mines of the Consolidation Coal Co.

Wheeling—A big deal in Marshall County coal is said to be pending between the owners and J. W. Miller, of Mannington, who is understood to be representing the Consolidation Coal Co. of Fairmont. The coal in question is the Mapleton vein underlying 20,000 acres in the Meade district and if the deal goes through the owners will receive in the aggregate, about half a million dollars. Coal rights for the Pittsburg vein have been selling for more than \$50 an acre but no sale of rights for the Mapleton vein has been reported for some time. The Mapleton seam is from 4 to 6 ft. thick and lies near the surface, above the Pittsburg seam, which here runs from 7 to 10 ft. in thickness.

McDonald—It is estimated that \$2000 worth of property was destroyed by a fire, Feb. 1, in the blacksmith shop at the Jumbo mine of the Pittsburg Coal Co. The building was completely destroyed but will be rebuilt at once.

Mexico

Coahuila—All the mines in northern Mexico are closed down as a result of the revolution in this locality. It is also reported that the foreman and a number of Japanese miners were murdered at the Palos mine, near Muzquiz, Coahuila. American capital is heavily interested in this district.

England

London—The probability of a general coal strike on Mar. 1 and complete disturbance of the industry was greatly increased by the failure, Feb. 7, of the national conference of coal owners and miners to effect a settlement. The miners met Feb. 13, to consider the operators' refusal to grant their demands. The delegates were in a defiant mood, and a general strike seems almost inevitable.

Belgium

Brussels—Fierce rioting broke out, Feb. 12, in connection with the coal strike at Mons. Soldiers were rushed to the scene on a special train. Strikers in mobs looted much of the town, overpowering the police when resistance was made. Many were injured.

Prussia

Antonienhütte—Many lives were lost in one of the pits near here, Feb. 12. Seven bodies have been brought to the surface, and the authorities believe at least 20 more men perished. The number of men in the pit is not definitely known, but all except those in the immediate vicinity of the bottom of the shaft were cut off and are almost certainly dead.

Personals

A. M. Hartwell, president of the Berwind Fuel Co. was recently in Duluth, inspecting the company's dock and briquetting plant.

B. W. Wistar, who has been with the Goff Kirby Coal Co., Cleveland, Ohio, for the last ten years, succeeds Mr. Houston in Cleveland on Feb. 1, as sales manager for the Moreland Coke Co. at that point.

W. D. Washburn, of Minneapolis, president of the Washburn Lignite Coal Co., recently visited the company's mines at Wilton, N. D., and while there formulated plans for improvements to be made during the coming summer.

D. G. Davis, recently appointed special inspector of mines for the Union Pacific Coal Co., will leave this month for an extended trip to the company's various properties, returning later to Evanston, Wyo., where he will make his home.

David Selway, manager of the Selway Coal Co., was in Columbus recently, with a view to selecting office space, preparatory to removing the headquarters of the company to Columbus. The Selway company operates a large new mine in the No. 8 seam at Fairport, and is an important factor in the eastern Ohio field.

Charles J. Coll will return to the employ of the H. C. Frick Coke Co. as superintendent at Brownfield, after an absence of 11 years. In 1900, Mr. Coll left the Connellsville region to go to Stellarton, Nova Scotia, where he was general manager of the Acadia Coal Co. Mr. Coll now succeeds W. L. Affelder, who is leaving to take another position.

C. E. Tobey, superintendent of the coal mining department of the Delaware, Lackawanna & Western R.R. Co., and president of the Scranton Y. M. C. A. District Mining Institute, has been secured as one of the speakers at the Pennsylvania Y. M. C. A. State Convention which meets at Bradford, Feb. 22-25. Mr. Tobey will address the convention on "Present Day Evidences of Social Advancement in Coal Mining Communities."

George W. Brymer, who succeeds J. F. Hannigan as superintendent of the Edgewater plant of the Tennessee Coal, Iron & R.R. Co., has taken up his new duties at Ensley, Ala. Mr. Brymer was formerly engaged as chief engineer of the northern division, Pennsylvania Coal & Coke Co., Cresson, Penn.; as superintendent of the Jed Coal & Coke Co., Jed, W. Va., and as division superintendent for the Pennsylvania Coal & Coke Co., at Patton, Penn. He went to Alabama from Philadelphia, Penn., where he was engaged in consulting work as an assistant to E. T. Connor, mining engineer, in making several extensive examinations and reports on large mining properties.

Obituary

J. H. Shelly, aged 28, of Jellico, Tenn., was instantly killed when a motor he was testing in the No. 1 mine of the Jamison Coal & Coke Co., near Greensburg, Penn., jumped the track and crushed him against the wall. Shelly was employed by an Illinois firm and was installing electric locomotives in the mine.

Calvary Morris, coal operator, banker and capitalist, died Feb. 5, at the Lakeside hospital, Cleveland, where he had gone, on Dec. 24, to undergo a minor operation. He was well on the road to recovery when he was taken with pneumonia and later was stricken with apoplexy. Mr. Morris laid the foundation for his business success at the coal mines. He was born in Athens, Ohio, 61 years ago, and gained his first knowledge of coal by weighing the product at the mines. He came to Cleveland over 20 years ago and entered into partnership with B. D. Babcock, under the name of Babcock, Morris & Co. Later he went into partnership with J. W. Ellsworth, under the name of the Morris & Ellsworth Coal Co. In 1897, Mr. Morris formed the Morris Coal Co., and later the Jefferson Coal Co and Morris-Poston Coal Co., taking an active part in the management of all three.

Industrial Notes

Monks & Johnson, architects and engineers, 7 Water St., Boston, report the complete installment of a \$23,000 coal-handling equipment for J. B. & W. A. Lamper, Lynn, Mass. The plant includes a single-man discharging tower of the Boston or steeple type with cable road over the present sheds. It is stated that this coal-handling equipment, manufactured by Mead, Morrison & Co., has greatly reduced the cost of handling the coal.

The Link-Belt Co. has just closed a contract for building a large coal tipple for the McGregor Coal Co. This will be erected on Rums Creek, Logan County, W. Va. The president of this company is John Laing, who is also chief mine inspector for the State of West Virginia. The tipple will be one of the largest in this section of the country. It will be built of structural steel, sheathed and roofed with corrugated iron, and will contain car feeders, trip makers, picking bands, a double set of "Link-Belt" shaking screens, slack conveyors and conveyors for taking the slack coal to the boiler house. The Link-Belt Co. will design, furnish and erect the entire equipment complete.

The Watt Mining Car Wheel Co., Barnesville, Ohio, announces that Ira E. Stevens and the Stevens Mine Fan Co., Old Colony Building, Chicago, no longer represent this company, and that on and after Feb. 1, 1912, all orders and inquiries will be handled directly from the main office at Barnesville. The company is prepared at all times to give prompt attention to mine-car requirements and maintains a force of expert car men for the purpose of designing new equipment or changing the old to meet present mining conditions in the various districts.

New Publications

FOURTH ANNUAL REPORT OF THE DEPARTMENT OF MINES, OKLAHOMA. Ed. Boyle, chief mine inspector, Guthrie, Okla. 180 pp., 6x9 in.

Report is for the year ending June 30, 1911, and is devoted almost exclusively to coal mining, although the production of lead, zinc, asphalt and oil is also covered. There was produced during the year, a total of 2,569,869 tons of coal, involving the employment of 8191 men in and around the mines.

THE RATE OF BURNING OF FUSE. By Walter O. Snelling and Willard C. Cope. Technical Paper No. 6, U. S. Bureau of Mines. 28 pp., 6x9 in.

The safety of a miner in his daily work depends to a great extent upon his ability to gage with reasonable accuracy the time that a certain length of fuse will take to burn and ignite a shot. Misfires and retarded shots, with their accompanying dangers, are largely due to defective or improperly handled fuse. Inasmuch as tests made by the authors of this report show that an ordinary fuse with a normal rate of burning of from 25 to 30 sec. per ft. may, under certain conditions, burn as fast as 1 sec. per ft. and, under other conditions, as slowly as 227 sec. per ft., the importance of keeping fuse from unfavorable circumstances of storage and use at once becomes apparent. Under ordinary conditions, nearly all types of fuse were found to show great uniformity in their rate of burning, but under the influence of pressure the rate was found to increase, in at least one instance, from a normal value of 28 sec. per ft. to something over 6 sec. per ft. Similarly, high temperatures were found to have a retarding effect and mechanical injury, due to pounding or hammering, resulted in such an increase in the rate of burning as to make it almost instantaneous. The paper gives in detail the results of tests that were conducted with the idea of investigating the effects of pressure, temperature, moisture and mechanical injury on the rate of burning of the several ordinary forms of miners' fuse.

Trade Catalogs

Howells Mining Drill Co., Plymouth, Penn. Catalog No. 28. Howells Mining Drills. 112 pp., 6 1/2x9 1/2 in., illustrated. A complete and profusely illustrated descriptive catalog of the numerous forms of electric, compressed-air and hand-power drills manufactured by the Howells company. Lists and prices of repair parts are given.

The Draeger Oxygen Apparatus Co., Pittsburgh, Penn. Catalog R, "Oxygen the Life Saver." 212 pp., 5 3/4x8 3/4 in., illustrated. This volume contains in addition to a complete, detailed and well illustrated description of Draeger rescue apparatus, a number of interesting and valuable notes on the general subject of oxygen breathing devices, the construction and equipment of rescue stations and instructions for rescue brigades. Five pages are devoted to listing old and recent literature on the subject of breathing apparatus.

Coal Trade Reviews

Current Prices of Coal and Coke and Market Conditions in the Important Centers

General Review

Coal supplies are reduced to a point where the situation is acute. In spite of the utmost efforts of the railroads, the movement has been below the consumption for some time, and actual suffering is now in evidence at some centers. Spot coal can be had only at fancy prices and many large steam users can get only sufficient fuel to keep their plants from freezing.

In the East at some anthracite-burning cities, a number of dealers have been supplying their customers with soft coal, and even wood. It is believed that six weeks of uninterrupted work at the mines would be required to fill orders now on hand, and some new record prices for this grade have been quoted. The cold weather has so crippled the railroads that they are in many instances concentrating their entire efforts on the movement of perishable freight, and entirely neglecting the coal tonnages.

Considerable suffering is being experienced in Michigan and northern Indiana and Ohio, with mines in the latter state getting only sufficient cars to work about 25 per cent. capacity. Unusually cold and stormy weather has prevailed in that territory and the railroads appear utterly incapable of handling the situation. In the South the demand is reported heavy, with prices hardly quotable and the situation bordering on a coal famine at some points.

Railroads appear to be catching up on deliveries to a certain extent in the Middle West, with the exception of the Illinois Central, whose mines are working only one day a week. Heavy storing by the large transportation systems continues, especially the New York Central who, it is claimed, are laying in supplies to the extent of a quarter of a million tons.

In direct contradistinction to the East, the far West appears to be experiencing an unusually mild winter, with the result that the markets are quiet and dull.

Boston, Mass.

New England is still short of coal, and to say that consumers and dealers are worried over the outlook would be putting it mildly. In a number of ports to the Eastward the dealers are out of anthracite and are supplying customers with wood and soft coal. In Calais, Me., several cargoes from the Spring Hill mines, Nova Scotia, have been received

for distribution through this section. The Boston dealers are able to get broken, stove and chestnut only in hand-to-mouth shipments, and at Providence the shortage is such that fancy prices are offered for prompt delivery.

All-rail, both bituminous and anthracite, are coming through slowly, and operators are slow about committing themselves ahead. Water freights have advanced; \$1.30 was paid on 2500 tons, Baltimore to Boston, and \$1.25 is asked from Hampton Roads.

Current prices are about as follows:

Clearfield, f.o.b. mines.....	\$1.25 @ 1.45
Somersets, f.o.b. mines.....	1.35 @ 1.55
Pocahontas, New River, Boston, on cars.....	4.50 @ 4.75
Pocahontas, New River, Providence, on cars.....	4.35 @ 4.50
Georges Creek, f.o.b. Philadelphia.....	2.67 @ 2.85
Pocahontas and New River, f.o.b. Virginia terminals.....	2.70 @ 2.80

New York

The supply of soft coal at the New York piers continues extremely short. The demand on contract is heavy and with the continuance of a short car supply and slow railroad movement, shippers are hard put to take care of their New York Harbor obligations. There is a good deal of spot inquiry from consumers who are anxious to stock in anticipation of labor troubles and this, coupled with the cold weather, keeps the market quite firm. Prices are somewhat stronger than last week, with the cheaper grades of coal scarcer and the better grades practically unobtainable except on contract. West Virginia steam coals are quite firm at \$2.65 f.o.b., while ordinary Pennsylvanias are held at from \$2.70 to \$2.75 f.o.b.

The loading piers continue to be handicapped because of the frozen condition of the coal and the delay in loading averages about three days. Towing conditions to the lower ports are extremely hazardous on account of ice in the river, making it difficult to get boats down to and up from the piers.

The stocks of all-rail consumers, owing to slow railroad movement, are gradually being reduced and from these consumers, more inquiry for extra coal is being received.

In the Sound ice conditions are extremely bad for marine transportation; at the Sound terminals scarcely enough coal is being received to take care of the demand, and there is a ready market there at good prices for any extra coal shippers have.

Philadelphia, Penn.

Seasonable weather still continues in this vicinity, and conditions as far as the retail trade is concerned, show no marked falling off. In fact, the demand is even better, and the supply is far from adequate. Temperature remains low, and as a consequence, the fires are kept going at top speed, the added consumption bringing increased business to the retailer. All sizes are moving off far more promptly than the dealers are able to replenish their stocks. Stove, chestnut and pea are far behind the market. As high as \$2.50 at the mines has been offered for pea coal, and even at this record figure, orders are being turned down. The situation is certainly growing critical.

As it stands at present, the output of the mines, brought to the market by the wholesale operators, is not beginning to supply the demand, which is far in excess of the production. From broken to the steam sizes of pea, buckwheat and rice, orders are far in advance of the available supply, and work at the mines for six weeks at full pressure will not begin to cover the orders already entered. A car or two on orders for twenty or more of any size, are thankfully received, for most of which they pay better than the circular price. The meeting of the anthracite operators and miners' representatives takes place on the twenty-seventh of the month, and is likely to add additional complexities to a situation already desperate.

Pittsburg, Penn.

Bituminous—There have been no important developments in the wage-scale matter, and there is no likelihood of any approach to a settlement being made in the near future, as the situation can hardly be righted without a suspension of mining for perhaps six weeks. Stocking of coal by consumers is unavoidable and it will be necessary for the safety of the market to allow these stocks to be worked off. On the other hand, the prospects are for a large demand in the lake trade, stocks being light in the Northwest, and a suspension longer than six weeks from Apr. 1 would encroach upon the navigation season.

Demand continues good locally, both manufacturing and domestic, and mines are running as well as they can considering weather and transportation conditions. There is a fair supply of cars, but the coal moves slowly, on account of

extremely cold weather. Full prices are readily obtained. We quote: Nut, \$1.05 @ 1.10; mine-run, \$1.10 @ 1.15; 3/4-in., \$1.20 @ 1.25; 1 1/4-in., \$1.35 @ 1.40; slack, 70 @ 75c. per ton at mine, Pittsburg district.

Connellsville Coke—Market prices show no change, but coke is a trifle easier to obtain. Sales of between 150 and 175 cars of prompt furnace have been made in the past week. Prompt foundry coke is about 5c. higher. We quote: Prompt furnace, \$1.80 @ 1.90; contract furnace, \$1.80 @ 1.90; prompt foundry, \$2.20 @ 2.30; contract foundry, \$2.20 @ 2.40.

The *Courier* reports production in the Connellsville and lower Connellsville region in the week ending Feb. 3 at 360,153 tons, a decrease of 40,000 tons, and shipments at 4052 cars to Pittsburg, 5592 cars to points West and 979 cars to points East, a total of 10,623 cars, a decrease of 500 cars.

Baltimore, Md.

Another spell of almost zero weather created an active market in the coal trade of Baltimore last week. The operation at the mines in both West Virginia and Maryland was seriously interfered with, thus reducing the output. Consumers appeared willing to pay almost any price for coal, but even at the higher prices, they were unable to procure any big supplies.

The higher prices for coal and the continued active demand has been the means of raising the hopes of the trade here. Jere H. Wheelwright, president of the Consolidation Coal Co., during the past week, spoke most optimistically over the future outlook for the coal trade. He stated that he believed that 1912 would be a splendid year for the coal business, and that he based his opinion on the large number of orders which his company had already booked for delivery. The market, at the present time, he further added, was in better shape than it had been for a long period.

The coke market continues active. Most of this product has been for consumers who made inquiries two or three weeks ago. Numerous inquiries were received during the past week, and the actual business done showed an increase over the previous week.

Buffalo, N. Y.

The coal situation here is fast growing distressing. There is difficulty with anthracite, on account of the enormous demand and the drawbacks to production and in both anthracite and bituminous alike the movement by rail is decidedly alarming. The railroads are swamped and every day reports come in that more of them are refusing to make the effort to move the nonperishable freight offered them. Shippers say that they have load-

ed coal cars extending all the way around Buffalo, from East Buffalo to Black Rock, chiefly for shipment to or through Canada, but are getting less and less service every day.

The situation Eastbound is quite as bad as it is West or North, for the New York Central is so blocked with cars that it cannot move and connecting roads, finding that their deliveries merely pile up at junction points, implore shippers not to route anything by that road if they can help it. This section and to the limit in all directions has seen nothing but severely freezing weather since the second day after Christmas and the mining regions are still colder, so that production is slow and has now become less than the new orders that come in.

Manufacturers are begging for a little bituminous so that their works will not freeze up and suffer from ice, but shippers can do very little but urge the roads to some sort of fresh activity. Buffalo is so far well enough supplied, as the mines are not far away and the coal roads are not badly congested.

Soft-coal prices are hardly quotable. All shippers are getting a 10c. advance and most of them could get almost any price in some instances if they could insure quick deliveries. For the present Pittsburg quotations remain at \$2.60 for three-quarter; \$2.50 for mine-run, and \$2.25 for slack, with coke \$4.25 for best Connellsville foundry and \$3.50 for stock.

Cleveland, Ohio

Unusually cold and stormy weather has resulted in a continuous good demand for domestic, as well as steam coal, with prices firm. Many mines in Ohio, Pennsylvania and West Virginia are closed on account of frost, and in consequence markets in this vicinity have not been over congested. Everything in the way of coal of all grades is well and promptly taken care of, car service being at a premium during the past week. Slack that was a drug on the market last week, has been well cleaned up with the returning of high prices that prevailed during January.

Prices range as follows:

<i>Cambridge</i>		
Mine-run	81	10
2-in.	1	20
1 1/2-in.	1	35
Slack	80	95 @ 1.00
<i>Ohio No. 8</i>		
Mine-run	80	95 @ 1.00
2-in.	1.05 @ 1.10	
1 1/2-in.	1.25 @ 1.35	
Slack	0.85 @ 0.90	
<i>Ohio No. 6</i>		
Mine-run	81	10
2-in.	1	20
1 1/2-in.	1	30
Slack	80	85 @ 0.95

Columbus, Ohio

Demoralization still continues in the coal trade in central Ohio and railroads are utterly incapable of coping with the situation. The trouble takes two dis-

tinct forms, the lack of motive power of railroads which makes it impossible for the connecting roads to move coal from junction points, and the acute car shortage caused by the tie up of so many cars at way points.

As a result of this condition considerable suffering is reported from Michigan, northern Ohio and northern Indiana points. Probably the greatest trouble is in Michigan where many factories have been compelled to close down and permit the small coal supply to be used for domestic and heating purposes. Reports show about 8000 loaded coal cars at Toledo awaiting movement into Michigan and the connecting roads either unable or unwilling to complete the haul.

As a result of the car shortage, mines in every section have been running on very limited time. The output is less than 25% of normal and in many cases mines have been closed down the entire week. Operators are able and willing to increase the production if only cars were available.

Retail trade has been active during the past week and customers are demanding immediate delivery. In Columbus and immediate vicinity the supply is adequate and little suffering is reported. Ice has caused some trouble in making deliveries. Prices are firm on all grades.

Prices prevailing in Ohio mining districts are as follows:

Domestic lump in Pomeroy Bend district	\$1.65 @ 1.75
Domestic lump in the Hocking Valley	1.50
Three-quarter inch	1.35
Nut	1.15
Mine-run in eastern Ohio	1.00 @ 1.05
Mine-run in the Hocking Valley	1.05 @ 1.15
Nut, pea and slack	0.80 @ 0.90
Coarse slack	0.65 @ 0.75

Cincinnati, Ohio

It is doubtful if this market has seen such a combination of favorable and unfavorable conditions continuing for so long a time in many years. During the extremely cold weather in January the river coal interests were almost tied up tight by a frozen river, which prevented the movement of barges in the harbor.

The cold weather and heavy snows, not only in the mountains, but here also are credited with being responsible for the unfortunate car situation. Several of the coal roads are putting down and taking up embargoes on all Western movements so rapidly that the mines have hard work keeping track of them. Reports from other cities in the state indicate that conditions are not much better there. The continued ice and snow on the streets are responsible for the added cost of wagon deliveries in the city and suburbs.

Demand is just about the same as it has been for several weeks, nut and slack being the strongest with prices at 85c. to \$1 and the tendency upward. The demand for lump coal is holding up un-

der the continued cold weather. The average temperature since the first of the year has been around 20°, with long stretches of zero weather.

Charleston, W. Va.

Except for a modification of weather conditions there has been no change in the coal situation in this section of the state during the past week. The milder weather has permitted a freer handling of cars, both loaded and empties, but normal conditions have by no means as yet been restored. Prices have not suffered on account of the improvement in shipping conditions and in some circles a belief prevails that there will be no drop back to where they were before the cold weather interfered with shipments.

West Virginia operators anticipate no labor troubles this year. The state went through the past year without a strike except for local difficulties lasting a few days at several mines. With the indications of trouble in other states, the West Virginia operators have hopes of being able to maintain a condition that will be of benefit to them in a financial way.

Memphis, Tenn.

Memphis has had one of the best coal-selling periods of weather that the coal dealers can remember. January saw the greatest tonnage of retail coal handled by dealers for any one month in our history. February has also opened up with fine prospects for a big business.

This good weather and good sales have made the wholesale market exceedingly stiff. To add to the weather conditions, we have had a shortage of cars both in Alabama and east and west Kentucky. These are the places from which Memphis has drawn most of its coal.

The Illinois Central R.R. is still tied up in their strike, which has certainly handicapped Memphis and all the territory south during this continued period of cold weather. The mines' prices have been stiff at \$1.50 for Kentucky lump.

Illinois has, for the last few weeks, practically withdrawn from this market, as they are unable to make shipments over the Illinois Central R.R. It has been impossible for the brokers and dealers to secure anything like sufficient quantity of coal from the mines to take care of the trade that has been offered.

Prevailing prices are as follows per ton:

Nut.....	\$1.00@1.25
Mine-run.....	0.85@1.00
Alabama lump.....	2.25@2.50
Mine-run.....	\$1.25
Cahaba coals.....	2.75@3.00

Nashville, Tenn.

This district is in the midst of another spell of cold weather, together with a car shortage which has prevailed for the past several weeks.

The demand for coal has been greater than ever and for spot shipments, big prices have been offered for all grades. It has been many years since the cities and towns in this district have been as bare of coal as they are at the present time. It has been a desperate situation for the past few days, and there is nothing that can save it except a spell of warm weather which we are likely to have at any time. Should we go into the coming week with very cold weather, a famine will be the result.

Prices vary considerably and it is rather hard to quote, but they range about as follows:

Standard lump.....	\$1.50@1.75
Standard nut.....	1.00@1.10
Standard screenings.....	0.30@0.40
Mine-run.....	1.00@1.10

Indianapolis

The steady cold weather during the past week caused a corresponding increase in the demand for domestic coal. While the railroads succeeded to a certain extent in catching up with deliveries, coal famines were reported at a number of points, necessitating the closing of school and other public places. The cold weather caused a lull in other traffic which permitted the railroads to concentrate their efforts on moving fuel and they were able to move practically all the coal mined.

Although the extreme cold weather and enormous consumption is thought to be over in this state, the sidetracks have become congested along the lines seeking to reach the Northern markets. This, however, is expected to clear up within the next few days. In the meantime the numerous orders coming from the Indiana dealers indicates that the next month will see vast piles of coal stored in preparation for a cessation in mining. It is given out that not in years have large consumers been so near the bottom of their storage piles as at present.

Chicago

Prices in the Chicago coal trade have stiffened in some directions. The belief is prevalent that there will be a suspension of the mines Apr. 1 and large consumers are attempting to acquire a surplus stock sufficient to tide them over until May.

Some dealers are inclined to believe that the prospective tie-up of the mines will last until midsummer and are advising customers to prepare for a suspension of that duration. The statement is made on good authority that the New York Central road is storing a quarter of a million tons of coal at Harrisburg, Ill. Prices for screenings still remain strong, and it is expected they will continue so until the present unsatisfactory operating conditions on the railroads have been remedied.

Prevailing prices at Chicago are:

<i>Sullivan County:</i>	
Domestic lump.....	\$2.87
Egg.....	2.87
Steam lump.....	\$2.37@2.57
Screenings.....	1.97@2.07

<i>Springfield:</i>	
Domestic lump.....	\$2.67@2.82
Steam lump.....	2.17@2.27
Mine-run.....	2.07@2.17
Screenings.....	1.92@2.03

<i>Clinton:</i>	
Domestic lump.....	\$2.52@2.77
Steam lump.....	2.22@2.32
Mine-run.....	2.17@2.27
Screenings.....	1.87@2.00

<i>Pocahontas and New River:</i>	
Mine-run.....	\$3.25@3.55
Lump and egg.....	4.20@4.30

Coke—Prices asked for coke are: Connellsburg and Wise County, \$4.65@4.75; byproduct, egg and stove, \$4.95; byproduct, nut, \$4.75; gas house, \$4.90@5.

St. Louis, Mo.

The market opened up strong the beginning of the week, following a slump the latter part of last week, especially in the Standard sizes. There has been a good demand during the past week for railroad coal, and a large tonnage of this is moving in equipment furnished especially for that purpose from the Standard field. All the railroad companies are laying in storage coal, and considerable of this is moving from the Springfield district, as well as the Standard, while but a small tonnage is moving out of the Carterville field. This is largely accounted for by the fact that the Illinois Central have no motive power even though they are receiving 50 new locomotives at the rate of one per day. The Iron Mountain has about all it can take care of at the present time.

Steam business in St. Louis and the country has put the market in good shape and all plants are preparing to store coal, several of them having already started. The same applies to several of the larger retail dealers, and it is taken for granted here that there will be a suspension in the Illinois field of at least three months, and possibly five.

Conditions on the Illinois Central seem to be getting worse, and the mines on that road are only working about one day per week. The Frisco Lines are doing better, as is also the Iron Mountain, with the exception that they are taking the larger part of their equipment for company coal. Indications are that the market on all grades will remain firm, with a tendency to move upward.

The higher-grade coals from the Inner district have been in remarkably good demand for country business, and the Mount Olive coal field is pretty well oversold. There has been an exceptionally good demand and a fair movement of anthracite at circular prices, also both byproduct and gas-house coke at \$5.90 for the former and \$4.75 for the latter has been hard to get. The smokeless market is in good condition.

The prevailing prices the early part of the week were as follows:

Franklin County	
Lump and egg	\$2.15@2.25
No. 1 nut	2.00@2.15
No. 2 nut	1.75@1.85
No. 3 nut	1.35@1.50
2-in. screenings	1.10@1.20
Carterville	
Lump and egg	\$2.00@2.25
No. 1 nut	1.60@1.75
No. 2 nut	1.40@1.50
No. 3 nut	1.25@1.35
Screenings	1.00@1.10
Mine-run	1.25@1.35
No. 1 washed	2.25
No. 2 washed	2.00
No. 3 washed	1.50
No. 4 washed	1.25
No. 5 washed	1.00
Standard	
6-in. lump	\$1.60@1.75
2-in. lump	1.40@1.60
3x6-in. egg	1.25@1.35
No. 1 nut	1.15@1.25
No. 2 nut	1.00@1.10
Screenings	0.75@0.85
Mt. Olive	
6-in. lump	\$1.75
3-in. lump	1.75
2x6-in. egg	1.40
No. 1 nut	1.30
No. 2 nut	1.10

Salt Lake City, Utah

Owing to the mildness of the weather the demand for coal is diminishing. All mines are well up with their orders, and the retail trade is quiet. The Denver & Rio Grande R.R. has placed orders with independent companies for 10 to 12 cars daily. This is a new departure in the policy of the railroad company and is taken to indicate that the Utah Fuel Co., a subsidiary organization of the Denver & Rio Grande, is conserving its own supply.

Mine prices are as follows: Lump, \$2.40@2.75; nut, \$2.15@2.25; slack, \$1.75.

Spokane, Wash.

The weather here has moderated to such an extent that almost no coal is being sold, the supplies in the basements being ample. It is not thought that Spokane or the Inland Empire will experience any more severe cold weather this winter, and in some places the spring flowers are coming up. Furnaces are still in operation, however, but are being supplied by wood as far as practicable. Prices are inclined to fluctuate enough to stimulate trade by some of the dealers, while the majority are holding to the regulation price.

The prices of standard coals for the week ending Feb. 7, were as follows:

	Wholesale	Retail
Rock Springs	\$7.20	\$9.00
Owl Creek	7.20	9.00
Kirby	7.20	9.00
Carney	6.70	8.50
Bearcreek	6.35	8.25
Roslyn steam	5.25	6.25
Canadian steam	5.25	6.25

Portland, Ore.

The market situation remains practically unchanged, the demand for coal being light owing to mild weather. Ore-

gon has enjoyed a very favorable winter and in consequence the demand for fuel has not been heavy. The demand for coal for manufacturing purposes shows no material fluctuation. The ruling price for Australian and Wyoming is \$9.50, including cost of delivery within the city proper.

Production and Transportation Statistics

THE CAR SITUATION

The fortnightly bulletin of the American Railway Association states that on Jan. 31 the net surplus of idle cars on the lines of the United States and Canada stood at 32,581, compared with 90,285 two weeks before, a difference of 57,704.

The decrease in the number of idle cars was most noticeable in the coal-producing sections. But almost every part of the country has experienced great difficulty in moving cars, owing to the extreme cold.

CHESAPEAKE & OHIO RAILWAY

The following is a statement of the coal and coke traffic over the lines of the Chesapeake & Ohio Ry. for December and 6 months ended Dec. 31, 1911, in short tons:

Destination	December	6 Months
Tidewater	367,310	1,970,464
East	200,383	1,069,419
West	937,089	5,733,771
Total	1,504,782	8,775,654
Coke	17,557	110,597

From Connections

Bituminous	23,404	117,326
Anthracite	3,338	18,749

ANTHRACITE SUPPLIES

Stocks of coal at tidewater were 521,283 tons on Jan. 31, 1912, as compared with 712,958 tons on Dec. 31, 1911, a decrease of 191,673 tons. The stocks at tide are lower than for years. It is generally estimated in the trade that the consumption of coal in January was 50% above the average. The actual consumption on the known figures in the month was nearly 6,000,000, but it was no doubt considerably more than this.

ANTHRACITE SHIPMENTS

Comparative statement of anthracite shipments for January 1911-12 is as follows in long tons:

	1911	1912
Philadelphia & Reading	1,134,280	1,186,534
Lehigh Valley	1,021,447	1,020,447
Jersey Central	772,130	760,035
Delaware, Lack. & West	863,371	791,698
Delaware & Hudson	611,758	567,279
Pennsylvania	591,917	542,819
Erie	678,531	682,845
N. Y., Ontario & West	230,683	212,039
Total	5,904,117	5,763,696

Foreign Markets

GREAT BRITAIN

Buyers continue to adopt a waiting policy pending further developments in

the labor situation, and large coal prices are easier for both prompt and forward loading. Small coals are steady, with an upward tendency. Quotations are approximately as follows:

Best Welsh steam coal	\$4.62@4.74
Seconds	4.44@4.56
Thirds	4.14@4.38
Best dry coals	4.26@4.38
Best Monmouthshire	4.20@4.26
Seconds	3.96@4.02
Best Cardiff small coals	2.58@2.64
Seconds	2.40@2.52

The above prices for Cardiff coals are all f.o.b. Cardiff, Penarth or Barry, while those of Monmouthshire descriptions are f.o.b. Newport, both exclusive of wharfage and for cash in 30 days, less 2 1/2% discount.

NOVA SCOTIA

Coal production of Nova Scotia, by companies, for year ended Dec. 31, 1911, was as follows:

Dominion Coal Co. (Glace Bay)	2,469,493
Nova Scotia Steel & Coal Co.	784,969
Acadia Coal Co.	278,131
Intercolonial Coal Co.	249,218
Inverness Ry. & Coal Co.	230,752
Dominion Coal Co. (Springhill)	216,325
Other companies	368,743

Total 4,597,631

Financial Notes

Gross earnings of Lehigh Coal & Navigation Co. for year ended Dec. 31, 1911, were \$13,733,777, an increase of \$1,091,664; net earnings were \$5,534,793, an increase of \$390,272; surplus was \$681,174, an increase of \$368,874.

The Boston Stock Exchange has recently listed 150,000 shares of the Pond Creek Coal Co. Authorized capital is 200,000 shares, par 10, of which 150,000 are issued. Stock is quoted at between \$16 and \$17.

Gross earnings of Huntingdon & Broad Top Mountain R.R. & C. Co. for year ended Dec. 31, 1911, were \$538,730, a decrease of \$133,507; operating expenses were \$425,831, a decrease of \$86,014; net, \$113,898, a decrease of \$27,494. Directors were reelected at annual meeting.

The syndicate to underwrite bonds to be issued under plan for merging Alabama Consolidated Coal & Iron Co. and Southern Iron & Steel Co. has been completed. The new company, to be known as the Alabama Consolidated Iron & Steel Co., is to have a total capitalization of \$33,986,000.

Lehigh Coal & Navigation Co. earned 10.2% on capital stock for year ended Dec. 31, 1911. Surplus available for dividends is \$2,709,370, showing a gain of \$465,326 over the best previous record. Gross revenues from all sources, \$13,733,777, an increase of \$1,091,664 over previous year.

January bonus awarded to the anthracite workers by the United States Commissioner of Labor amounted to 7% of their month's pay, and with the flat increase in wages of 10% allowed to the men by the Strike Commission of 1902, makes their rate of pay in January 17% higher than the wages prevailing before the Roosevelt Commission brought the operators and their men together. The total benefit to the mine workers from the bonus system has amounted to \$30,000,000 since 1902. This is aside from the 10% flat increase in wages.